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THE
Journal of the Society of Arts,
 AND OF
THE INSTITUTIONS IN UNION.

111TH SESSION.]

FRIDAY, FEBRUARY 17, 1865.

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TABLE OF CONTENTS.

Announcements by the Council :—Ordinary Meetings — Cantor Lectures — Final Examinations : Botany—Musical Education	Page 217	Society, for Readings, Music, and Lectures—Marlborough Reading and Mutual Improvement Society—Metropolitan Association for Promoting the Education of Adults—Richmond Young Men's Society	228	Resin in France—American Hops—Patent Laws—Marine Railway Round the Falls of Niagara	233
Proceedings of the Society :—Cantor Lectures: Second Course: 2nd Lecture—Eleventh Ordinary Meeting — “The Claims of Authors and Inventors to Protection for and Property in Designs and Inventions First Published at Industrial Exhibitions.” By T. Webster, Esq., Q.C., M.A., F.R.S.	218	Art Schools and Art Instruction	229	Colonies :—New Zealand—Cotton and Sugar in Queensland	234
Discussion	223	The Patent Laws	232	Obituary :—The Duke of Northumberland—Sir John hare, F.G.S., F.S.A.—Joseph Lies	234
Proceedings of Institutions :—Knutsford		Dublin International Exhibition	233	Notes :—British Horological Institute—West London Exhibition—Exhibitions—What is an Inch of Rain?	235
		Fine Arts :—South Kensington Museum—Exhibition of Drawings on Stained Glass	233	Meetings for the Ensuing Week	235
		Commerce :—The French Treaty and English Soda and Bleaching-powder—		Parliamentary Reports	236
				Patents	236

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at 8 o'clock.

FEB. 22.—“On the Municipal Organisation of Paris, especially with reference to Public Works.” By GEORGE R. BURNELL, Esq., F.G.S.

MARCH 1.—“On the Means employed in taking Fish, especially with reference to Submarine Illumination.” By F. W. CAMPIN, Esq.

CANTOR LECTURES.

The Second Course of Cantor Lectures, the subject being “The Applications of Geology to the Arts and Manufactures,” by Professor D. T. ANSTED, M.A., F.R.S., is now being delivered on Monday evenings, at Eight o'clock, as follows :—

FEB. 20TH.—LECTURE 3.—On Mineral Materials used for the Purposes of Construction: Plastic and Incoherent Materials (Clays and Sands).

FEB. 27TH.—LECTURE 4.—On Mineral Materials (*continued*): Building Stones and Slates, and their Relative Value under given Circumstances of Exposure, and on Methods of Quarrying.

MARCH 6TH.—LECTURE 5.—On Stratified Deposits of Minerals as Coal and Iron Ore, usually obtained by Mining Operations, and on Mining Methods for such Deposits.

MARCH 13TH.—LECTURE 6.—On Metalliferous Veins or Lodes and their Contents, and on the Extraction of Metalliferous Minerals from Lodes.

These Lectures are free to Members (without ticket), and every Member has the privilege of admitting ONE Friend to each Lecture.

FINAL EXAMINATIONS—BOTANY.

In addition to the Prizes in this subject offered by the Society of Arts to candidates taking a Certificate of the First Class, the Royal Horticultural Society offers five prizes, of £5, £4, £3, £2, and £1 respectively, to the five candi-

dates, being gardeners by profession, who, taking any grade of certificate in Botany, obtain the highest number of marks in that subject at the Final Examinations in April, 1865.

MUSICAL EDUCATION.

The Council have appointed a Committee to inquire into the present state of Musical Education at home and abroad.

A letter has been addressed to the Foreign Office, requesting the aid of Earl Russell in obtaining for the use of the Committee, through the intervention of Her Majesty's Ministers abroad, detailed information concerning the Musical Schools in the principal capitals of Europe, and to this letter the following reply has been received :—

Foreign Office, Feb. 6th, 1865.

Sir,—I have laid before Earl Russell your letter of the 27th ultimo, respecting the desire of the Council of the Society of Arts to obtain, through the intervention of Her Majesty's Representatives at certain places abroad, information with reference to Musical Schools at the places indicated, and I am to request that you will inform the Council that instructions have been sent accordingly.

I am, Sir,

Your most obedient humble servant,

J. HAMMOND.

The Committee issued the following queries to the professors, amateurs, and others interested in the subject, and desire to obtain their opinions thereon. Members willing to aid them in this inquiry are requested to communicate their views :—

1. What are the essential differences between the plan of the Royal Academy of Music in London, and the Conservatoires of the Continent, with regard to—
 - a. Their constitution and management;
 - b. Their revenues as derived from the State, annual subscriptions, fees from pupils, concerts, or other sources.

2. State the nature of any other Institution in the metropolis or the provinces, for providing or improving Musical Education.

3. The expediency or otherwise of taking the present Royal Academy of Music as the basis of any enlarged Institution in this country.

4. What improvements might be effected in the Royal Academy of Music?

5. Is any union between the Royal Academy and similar Schools, Cathedral Choirs, or Local Institutions desirable or otherwise?

6. Could the Local Examinations of the Royal Academy of Music be extended, and how?

7. Does the Royal Academy in any way promote the improvement of Military Music?

8. Could any useful connection be established by the Academy with the Regimental Volunteers or other trained Musical Bands?

9. What proper security may be taken for obtaining due results from any Funds granted by Parliament to the Royal Academy?

10. What is your opinion respecting—

a. The advantages derivable from Public Concerts.

b. The test of Musical Proficiency by Examinations.

c. The Formation of a National Musical Library, and of a Collection of Musical Instruments, by gifts, loans, &c.

d. The Competitive trials of Performers and of Musical Instruments.

e. The use of a standing Musical Jury, as in the French Institute.

Proceedings of the Society.

CANTOR LECTURES.

SECOND COURSE.—SECOND LECTURE.—MONDAY, FEB. 13.
SPRINGS AND WATER SUPPLY.

Professor ANSTED remarked that a supply of fresh water is a matter of such extreme importance that every inquiry connected with it is well worthy of attention. It is connected with geology, for the conditions under which water exists in the earth depend on the arrangement of rocks and the facilities for circulation among and between them. He proposed to point out the great facts on which water-circulation and water-supply depend, and enable his audience to understand and appreciate the efforts made to obtain ample supplies when required. The source of water is the ocean; the means by which it is transferred from the ocean to the land is the atmosphere; and the circulation of water through the earth is the fact to be borne in mind in all investigations concerning water. Of the rain that falls a large proportion is attracted to the summits and flanks of mountain-chains, to upland valleys and lofty plains; the spots of heaviest rain-fall have the sea at no great distance, and winds blowing more frequently from the sea than from the interior of the country. Much rain reaches the earth on slopes looking towards the sea, and a large quantity of water is conducted by natural channels to rivers, and across low lands to the ocean. But of a large district only a small proportion consists of river-courses, whilst the rain falls on the whole surface. The soil becomes wet, the subsoil behaves in like manner, and moisture reaches the underlying rock. Of the rocks some are sands, sandstones, or limestones, and others fragmentary rocks. These allow water to enter, and give back the water at need. Others are impermeable strata, between or amongst which are beds shutting off water. Such are clays. All rocks contain water. Granites and compact marbles, in their driest state, hold from 4 to 4 per cent. by weight; and, as a cubic yard of such stone weighs two tons, each ton of the least absorbent rock will contain a pint of water. The water held by common loose sea-sand amounts to at

least two gallons in a cubic foot. In ordinary sandstones nearly half that quantity can be contained; and in best sandstones five pints of water are contained in each cubic foot. Thus in an area of such sandstone, occupying ten square miles, and ten yards in thickness, the quantity of water contained is from four to five hundred millions of gallons. This would fill a reservoir of a hundred acres to the depth of ten feet. But sandstones are rarely without bands of clay separating their water contents into sheets, and owing to faults and vertical bands of compact mineral, a sandstone district is broken up into boxes, each one of which is independent to some extent of the rest. Sandstones have also been tilted, and stand at a considerable pitch, tolerably uniform over great distances. Some varieties of sand-rock passing into pudding-stone on the one hand and quartzite on the other contain no water, but even in such rocks there are fissures and cracks wherever there is an exposed surface. Into these water penetrates. Of limestones the least absorbent hold four pints in the cubic foot; while a cubic foot of Bath stone will absorb a gallon; and some magnesian limestones twelve pints. A cubic foot of soft chalk will hold two gallons of water, or as much as loose sand, taking up half its own bulk of water and yet hardly appearing wet. By pumping, a large quantity of water may be obtained from chalk, for it acts as a sponge, the water sinking to the bottom. In most limestones the water does not come away by pumping, being kept back by friction as well as by capillary attraction. Limestone is more available as a water-bearing rock than sandstone, being more cracked and fissured at all depths. It is acted on by water, both mechanically by wear, and chemically by becoming dissolved. The cavernous nature of limestone is one of its most remarkable features, and at the intervals of strata there are spaces allowing a free passage to water, besides vertical fissures, dividing up the mass into smaller areas, each one of which has its own water system, though all communicate. Clays often contain as much as ten per cent. of water (by weight), and clay rocks, such as the varieties of schist, which are extremely numerous, are similarly constituted. Water is present in great abundance in the rocks near the surface of the ear' h, not only in the substance of all, but in the interstices. Of the rain that falls upon the earth at any place not more than one-third runs off the surface and enters the sea by rivers. What becomes of the rest? Part is evaporated; part supplies life; but an ample supply enters the earth. Down natural channels the water passes; occasionally through a permeable rock, sometimes slowly with much interference, and sometimes into cavities. It is conveyed horizontally, and rises here and there to the surface under the influence of the pressure of a column whose height has reference to the level of the spot at which it first entered as rain. This circulation is due to the natural inequalities of the land. As the rain falls mostly on mountains and high ground, and rocks are usually tilted towards the plains, the tendency of water to run down a slope in the interior of the earth as well as on its surface, ensures the conveyance of ample supplies. These may exist under pressure arising from the fact that the channels formed between two impermeable rocks are closed pipes. But because the dip is not always the same as the natural slope of the surface, and that faults remove rocks to a considerable distance vertically, water will sometimes find an issue at a considerable distance; it may well up at a fault, or come out at an artificial cutting, though always at a lower level than that at which it entered. Water obtained by any of these means is called a spring. Land springs occur in sand or gravel, resting on impermeable strata, and receiving a larger quantity of rain on their surface than is carried off by evaporation or streams. The water accumulates below, instead of upon the surface. Its depth is rarely great, and it is reached by wells. The supply varies with the rain-fall, and in dry seasons fails or gets much lower than usual. The quality of such water is

lible to injury, owing to the filtration into it of organic matter from above. Wells in such localities sometimes yield upwards of a hundred grains of solid matter to the gallon. A second class of natural springs issue on hill sides, in valleys, or on plains surrounded by higher land. They depend on the outcrop of strata which carry water, but rest on other strata that are impermeable. The issuing of springs under these circumstances is easily-understood; though the phenomena may become complicated and obscure. The source of the supply may be distant, and much above the level of the point of emergence. When it issues, the water may be a considerable stream, or may drain out in a multitude of springs on a continuous line of outcrop. Groups of springs of this kind are often important, dividing the irregularities of season over a considerable time, and to some extent independent of season. The water, having filtered through the earth for a long distance, is fresh and wholesome. Springs of this kind may be tapped on their way to the natural outlet. The supply they bring is limited, and what is taken at any one place is taken from the general stock. It may be that the upper rock is porous and rests on an underlying, impermeable stratum. The supply is then more abundant but less regular. Good examples of such springs exist in the Cotswolds, where, all along the oolites with the lias, groups of springs issue. A few days after the rain most of these springs become swollen, and run freely. After dry summer weather the supply falls off. In this case the dip of the beds changes, but the main cause of the irregularity must be sought for in the fact that, though crop-springs in one sense, they are land-springs in the nature of their supply. A third class of mineral springs issues where the containing rocks are interrupted by faults. In this case there are several possibilities. A fault acting as a wall, because it is filled with clay, will in most cases be accompanied by a spring, though not always at the exact spot where we might be inclined to look for it. Artesian springs occur in many places, and have been obtained artificially from the earliest times. A permeable bed between two impermeable beds, crops out at the surface, and there receives the rain-fall and surface-water. The level of this outcrop is higher than that of a part of the surrounding country beneath which the strata pass, owing to their dip. The permeable bed thus represents a bent tube, and may be kept full of water under a pressure corresponding to the height at which the porous bed crops out. If, then, a well is sunk or a hole bored, the water will rise in it, not only towards, but even in some cases far above, the surface, in a jet. The chief Artesian wells, and the oldest in Europe, are in the north of France, and they seem to have spread thence through the other countries of Europe. They are sunk through the lower tertiary strata to the chalk, from whose upper beds the water is generally derived. The construction of this class of wells is easy and inexpensive. The Artesian wells of Artois date back to the twelfth century. In Italy and Germany, ancient and successful wells of this kind exist, but it is only since the commencement of the present century that they have become general in Europe. In and around Paris there were already, in 1845, not less than eighty deep Artesian wells through the tertiary strata into the chalk. The supply varies very much, but is tolerably constant in the same well. A supply of from 30,000 to 150,000 gallons per day is the common yield, and the expense of sinking is extremely moderate. The sinkings for the supply of Paris commenced at Grenelle, in 1833, and continued till 1841, when water-bearing strata were reached at 1,800 feet, at a cost of £15,000. The first rush of water was at the rate of nearly a million of gallons per day, rising 120 feet above the surface. This continued for some time. Artesian wells are common also in England, not only in and around London, where the geological conditions closely resemble those of Paris, but at Cambridge, through the gault, at Liverpool, through the new red sandstone

and elsewhere. The Artesian wells of London are confined to borings through the tertiaries into the chalk, and do not include any sinkings to the greensand. The depth of most of the Artesian wells of London is less than 400 feet, and none of them are much above 500 feet. Some enter the chalk to a depth of 200 feet, or more, and therefore obtain their water to some extent from that formation; while others only reach the chalk, and obtain water from the sands. The tertiary strata pierced are rarely more than 250 feet in thickness. The water, when reached, seldom rises higher than from 40 feet to 60 feet below the level of the Thames high-water mark, and thus considerable expenses are incurred in lifting it. The wells at Cambridge penetrate the gault to the lower greensand at a depth of from 100 feet to 150 feet. The cost is small, and the supply at first rises to or above the surface. It is now 10 feet or 12 feet below. The supply is large and steady, and the number of wells within a few square miles amounts to several hundred. The wells in the new red sandstone at Liverpool and elsewhere are also very numerous, but nowhere very deep. The quality of the water obtained from Artesian wells is a matter of importance. Water passing through a course of strata absorbs mineral matter; but clay is capable either of removing mineral salts from water when they are already present, or yielding various salts if the water be pure;—and thus waters passing through a great thickness of clay may be either remarkably pure or very hard. Of the different minerals found in water there are some that produce hardness, and interfere with the use of the water for detergent purposes, though not otherwise injurious. The alkaline salts render water soft, and thus the large quantity of salts of soda and potash in some of the waters from deep wells does not interfere with their value for household purposes. Carbonate of lime and magnesia, on the other hand, and the salts of iron, though they render water hard, leave it well fitted for drinking purposes. A fifth class of springs is somewhat exceptional, occurring in connection with disturbances of strata, or the presence of metamorphic rock. Such springs are charged with mineral matter and gases, including free carbonic acid gas, nitrogen, hydrogen, oxygen, and sulphuretted hydrogen gas, with a long series of salts of most of the metals. A large quantity of matter is brought by these springs to the earth's surface from the interior, upwards of 16,000 tons weight per annum of various salts being estimated as brought up to the surface from the mineral springs of the central plateau of France. These springs are thermal, or possess a temperature higher than the mean annual temperature of the place at which they emerge. This temperature varies, and sometimes reaches the boiling point. The water rises from great depths, and often in large quantities. These springs are found in all parts of the world, and at all levels above the sea, but they are usually most abundant in mountainous regions, or near volcanoes. The flow of springs is not always uniform, but deep springs are more uniform than those which come from near the surface. For the cause of small and irregular variations we must probably look to the effect of the seasons, but there are marked periodical variations of supply in particular cases that require a more definite explanation. They are known as intermittent springs, and are almost confined to limestone districts. The river Mole, in Surrey, issuing from the chalk, is an example of this kind of spring. It appears abruptly at intervals, which are nearly regular; then runs strongly for a certain period, and as suddenly stops. There probably exists in the chalk hills adjacent, a reservoir filled from the rock above, but with only one outlet, which by some accident of the stratification, curves upwards a few yards before turning down again. So long as the water in the reservoir is not higher than the top of the curved part of the water-way no water can run out, but as soon as this happens, the bent tube acts as a siphon, and when it once begins, continues to carry out the water till it has emptied the reservoir. Such are the phenomena

of springs, natural and artificial, and such the methods adopted by nature and imitated by man to bring the water from the interior of the earth once more to the surface. Let me now point out the application of this great subject to the supply of towns. Some arrangement that shall secure a permanent supply of water for cities is essential. For this purpose most large towns are situated on, or near, running streams. But as the town increases, the waters of the stream become reduced in quantity by the large use made of them, and deteriorated in quality. Wherever there is a large population the sewage is in excess of the demand of the agriculturist, and is conducted into the nearest running water. Thus the waters of the river as it passes each town become smaller and more impure as the need of water becomes greater. Springs are resorted to for potable water, and the river water is only used for washing. Rain-water is collected and stored, but rain-water in a town is rendered foul by the admixture of smoke and vapours, and the supply is of little value. Means have been resorted to from time immemorial to obtain and conduct water from natural sources of supply to large cities. The Romans obtained water in this way from distant places, and conveyed it by aqueducts to the spot where it was needed. Long before the Romans, the Greeks had conveyed water over the surface in closed pipes, taking advantage of the fact that water stands at the same level if there is free communication, no matter how irregular the form and dimensions of the channel. These methods are resorted to at the present day, and with similar success. But a supply of water is not a thing that can be secured easily and without cost. It is an engineering operation for which the aid of the practical geologist must be sought. To obtain pure water for a town, resort must be had to contrivances suggested by, or adapted to, the physical condition of the country surrounding the town, and thus, while in some cases springs may be resorted to, in others rivers or canals may be used; in others, streams may be intercepted at or near their source; in others, mountain-lakes or tarns may be rendered available; and occasionally the rain-fall of a limited district may be collected and stored in reservoirs, whence the water is carried underground or on the surface to a reservoir near the place where the supply is needed. Examples of all these methods may be found in the various towns of England. There are certain limits to the supply of water from springs even the most favourably circumstanced, which now require consideration. Chalk, or loose sand and some sandstones, yield a large quantity of water, replaced from time to time by rain, and the quantity contained in a given area of rock may exceed the quantity required for the town on the surface. But it by no means follows that water is obtainable because it is present in the rock. The loosest varieties of rock are sufficiently close to offer difficulties to the free passage of water; and even from wells of exhaustion the quantity of water removed in a given time is not only incapable of being increased, but the rock is only drained of water **within the content** of a cone whose base is at the surface and whose apex is at the bottom of the well, and the area of whose base is rarely more than half a mile in radius. The two rocks that yield the largest quantity of water are chalk and soft sandstone; and in neither of these can more than a million gallons per day be expected from a single well. To yield this maximum, such wells must be more than a mile asunder. It could only be from a natural reservoir of large size, existing under pressure in the interior of a rock, that a large permanent supply could be obtained. The expense of Artesian borings, though varying much according to the particular circumstances of each case, is rarely very great. In Europe, the cost of boring has rarely much exceeded 10s. per foot if the depth is under 200 feet, one pound per foot if from 200 to 500 feet, two pounds a foot from 500 to 1,000 feet, and three pounds per foot from 1,000 to 2,000 feet. There are thus powerful inducements at all times to resort to this

expedient. On the other hand, it must not be lost sight of that there have been some very costly instances of failure after boring to a great depth in promising strata. When, owing to increased population, a deterioration of the quality of the water, or a diminution of the regularity of the supply, it is necessary to have recourse to some other contrivance than springs, the old Roman method of constructing an aqueduct has been resorted to. Thus, in the case of London, the "New River" was thought a great success. But opportunities of cutting off water are gradually becoming more and more scarce, while it becomes always more difficult to keep a stream clear. Such contrivances gradually cease to be applicable, and only when connected with reservoirs can this supply be recommended. But the construction of a reservoir is a very serious matter, as is known by fatal experience in some recent instances. It is not twelve months since the bursting of a newly-constructed reservoir in the neighbourhood of Sheffield produced a serious loss of life and property. Thus in this mode of obtaining a supply there are important points to be considered. I may state these as, first, the ultimate source of the water; secondly, the storing it in reservoirs; and, thirdly, the conveying it to its destination. Where there is a natural lake of pure water sufficiently large and well supplied to ensure a permanent supply, no better source can exist. The cost of conveyance is often a barrier against the adoption of such plans; but the possession of a natural reservoir, always full of the purest water, is no slight matter. But if there is no lake, natural springs, if sufficiently large in quantity and good in quality, may be made use of. Thus many of the sources of the Thames are powerful enough to be worth taking for the use of London. But to this there has always been a strong objection. The quantity of water entering the sea at the mouth of the Thames is so little more than sufficient to ensure a permanent stream that it cannot afford to lose any tributary, however small. Even when a single spring can be taken it rarely happens that the flow is so regular as to be sufficient without a reservoir. In hilly districts it is usual to take advantage of natural irregularities of the land, and select the head of a valley, where a convenient space can be enclosed. Such embankments are not always dangerous; but a weak point in the stratification may be the cause of an accident, as well as faults of construction. Reservoirs are necessary where the rainfall of a district is to be collected and transferred to a distant spot. In Lancashire and Yorkshire there are several instances of this arrangement. The rainfall of the district, the form of the collecting ground, the rock of which it is composed, and the dip of the rock, are matters of inquiry, and need the knowledge and experience of a geologist. Manchester is supplied from the drainage of a gathering ground of 18,000 acres, at a distance of sixteen miles from the city; Liverpool, from an area of 10,400 acres, twenty-six miles distant; Newcastle-on-Tyne, from 4,000 acres, twelve miles distant; Bolton, from 400 acres, four miles distant. The lecturer, in conclusion, gave a brief notice of the water contents of the various British rocks. The upper tertiaries of England, and the gravel, afford land springs. It is not till we penetrate the lower tertiaries, and reach the permeable sands between the London clay and the chalk, that we obtain large supplies from Artesian borings. The supply from the sands below the London clay is extremely large. Chalk contains an enormous quantity of water, distributed through the mass, though chiefly abundant in the lower part. The lines of flint favour percolation, and occasional spaces in the rock are generally full. At intervals in the chalk are beds that hold back water better than the rest. Water may almost always be obtained by sinking into chalk to a sufficient depth. Wells sunk through the chalk into the upper greensand are not always more successful than those terminating in the chalk; but the gault below the upper greensand being impermeable, water may be expected on reaching this bed. The lower greensands are extremely

wet. Large supplies may be expected from sinking to this rock, but the quantity obtainable from a single well, or from wells within a given distance of each other, is limited. The water of the lower greensand is irony if got near the outcrop, but when filtered through other beds, especially when passing through clay, it becomes more pure. Little water can be got from the Weald clay, nor is the Hastings sand to be depended on. The Kimmeridge clay and the Oxford clay are retentive, and have little value as water-bearing beds. Water is to be got between or even amongst these two bands of clay, but it depends on local conditions, and its presence cannot be assumed without proof. The Portland rock includes overlying stones and an underlying sand, the former of which holds water in crevices, the latter in its mass. The lower oolites contain water, the alternation of clays and open limestones being very frequent. The wells have to be sunk into the rock to its plane of saturation, or even through it to the clay, as the limestone does not otherwise yield a supply. Lias holds back water, so that at its contact with the lower oolite there is almost always a line of springs, and the supply is large and constant. Wells sunk into the upper beds of the lias rarely fail in obtaining water, but the quality is not good. Wells sunk through the lias obtain water from the new red sandstone. Wells sunk in the new red sandstone are almost certain of success; but, owing to the number of close faults, the quantity cannot be depended on, and the water is apt to be salt. The new red sandstone is eminently a water-bearing bed, and the numerous alternations of marl and sand render it possible to obtain water from almost all depths. The magnesian limestone is full of cavities filled with water to a certain level. In the coal measures, and in the mountain limestone, wherever there is an impermeable band between strata, or at faults, water is found. The faulted condition of the carboniferous and older rocks in England greatly affects the water capacity of the rock. The old red sandstone is a variable rock, sometimes containing much water in sandy beds, sometimes in cavities, and, at intervals, between the strata. There is generally a good store of water wherever this rock prevails. In Silurian rocks water is got from faults and fissures, which are very numerous. The limestones of this period are, for the most part, argillaceous, and hold back water. Slates, schists, and all varieties of granite, hold water only in fissures. Where there is a considerable rainfall these rocks sometimes afford large supplies. Little dependence can be placed on them, for the fissures do not communicate readily from one to another. A remarkable instance of successful sinking in granite exists in the island of Jersey, where a sinking was commenced in the solid granite, and was continued to a depth of 234 feet, all compact rock. At this depth a spring was reached which rose seventy feet in the shaft, and has continued at that level.

ELEVENTH ORDINARY MEETING.

Wednesday, February 15th, 1865; PETER GRAHAM, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Reeves, Miss Sarah, Rectory Grove, Clapham, S.
Reid, Captain Andrew G., 17, Sunderland-terrace, West-bourne-park, W.
Ridley, Rev. N. J., Hollington-house, Newbury.
Templeton, Archibald, 16, Argyll-road, Kensington, W.
Templeton, John, Budge-row-chambers, E.C.
Wallace, Hugh, Chemical Works, New-road, Battersea-park, S.

The following candidates were balloted for and duly elected members of the Society:—

Cockel, George, 77, Onslow-square, S.W.
Creswick, J. Frost, 8, Bloomsbury-square, W.C.

Evans, George, Newton Heath, Manchester.
Kirkman, C. F., 27, Claremont-terrace, Fentiman's-road, South Lambeth, S.
Morey, Samuel Dance, Ironmonger-lane, Cheapside, E.C.
Seymour, J. R. W., 23, St. Augustine-road, Camden New-town, N.W.
Telbin, William, 29, Winchester-crescent, Cheyne-walk, Chelsea, S.W.
Tetley, J. Rimington, 21, Carlton-hill, N.W.
Tonge, George, 3, Lancaster-terrace, Upper Hyde Park-gardens, W.

The Paper read was—

THE CLAIMS OF AUTHORS AND INVENTORS TO PROTECTION FOR AND PROPERTY IN DESIGNS AND INVENTIONS FIRST PUBLISHED AT INDUSTRIAL EXHIBITIONS.

By THOMAS WEBSTER, Esq., Q.C., M.A., F.R.S.

Exhibitions of products of industry, or industrial exhibitions, owe their origin to this ancient Society, the first and, until very recently, the only representative in this country of practical science. The Great Exhibition of 1851, the parent exhibition of the industry of all nations, drew its first breath within these walls; and most here present know that the International Exhibition of 1862 was entirely originated by this Society; and it is not too much to affirm that the seed so sown has borne fruit in exhibitions in the Sister Isle and in other countries, as well as in industrial exhibitions in this metropolis and in the provinces. Whatever may tend to foster and give permanency to such exhibitions is, it is conceived, well deserving the most careful consideration. The reward of the exhibitors by prizes, honorary and pecuniary, is a stimulus not to be disregarded and of a permanent character; but the experience of these exhibitions has produced a strong conviction in the minds of many that, unless something more can be done, unless a more lasting reward and benefit can be ensured to the successful exhibitor, unless he can have property in and protection for the product of his brain as embodied in a particular object, the stimulus will not be sufficient to make such exhibitions permanent and self-supporting. Such exhibitions may, it is conceived, be regarded as marts—as places in which products that have received the approbation of competent judges and the public, may redound to the substantial and permanent benefit of the exhibitor. That this operates most powerfully with the established trader, with the capitalist whose products have acquired or may acquire, through the exhibition, a notoriety, and is productive of substantial benefit, will not be disputed; but the exhibitor who has made his first successful attempt in a design or invention may see others reap all the pecuniary benefit, if not the honour, of that upon which they have bestowed neither time nor money. The real question involved in the preceding considerations, is how can such reward be best secured to each exhibitor, and what should be the nature of the reward? This may be looked upon as pre-eminently a "working man's question;" I cannot but regard it as one of the great social questions of the day, in what manner the artizan, the skilled mechanic, the youth just emerging from our educational establishments, can utilise the talents which he may be endowed, so as thereby to advance and rise to that social position which it should be the ambition of all to attain. The exhibition of a successful product of industry may be the first step on the ladder, but may afford no assistance to its retention, or to the attainment of the second or subsequent step. The question of property in such a product, and protection for that property, without which the name of property is an empty sound, whether as a matter of right or of policy, cannot be evaded; it is just that the author should not have property in and protection for the product of the brain embodied in some practical and useful shape, and given to the world for the benefit of his fellow-creatures?

That the author of such useful product so exhibited has no claim for remuneration has not yet been asserted within these walls, but although a proposition so repugnant to our innate sense of justice may not meet with any avowed advocate, there are not wanting persons who, from the views expressed on the subject, can hardly stop short of such a conclusion. They concede that the author is entitled to such product so long as he keeps it to himself; he may hum the tune, sketch the design, or use the apparatus in private, or in his own closet; but if he chooses to publish it, he has, they contend, by such publication, given it to the world; he has thereby dedicated it to the public, and what the public have once acquired they cannot be deprived of, but may utilise to their own purposes without regard to any claim by or on behalf of any other person.

This is the condition under which, at present, the author of any design, or the inventor of any useful product, publishes that design or product at an industrial exhibition. Is it politic or just that such a state of things should continue? Have not such exhibitors a claim to property in, and protection for, the products of their industry? That many persons may be willing to forego any more substantial reward than the glory of the exhibition is no answer to the just claim to substantial remuneration for the time, labour, and skill, which may be their only capital, expended on the product or design, and then first published. The labourer is worthy of and deserves his remuneration, without which it can hardly be supposed that the stimulus will be sufficient year by year to reproduce a succession of novelties by working men; that is, by the individual members of that large portion of the community who must earn their daily bread by daily labour, whether mental or manual, whose only capital in fact is such labour.

Circumstances wholly beyond control may exclude the mass of the people from acquiring property in land or houses, but their attainments and pecuniary means may be adequate for the acquisition of property in the embodiment of the labour of their brains; beyond this they may be unable to advance without the aid of those who are in possession of the capital of accumulated wealth. It has been often remarked that there would have been no Watt without a Boulton, or, in other words, that the most successful labours of intellect would fall still born without the aid of the possessor of accumulated wealth and commercial influence. How these two talents, the capitals of intellect and of money, can be brought together is a great social question, to my mind the greatest social problem for the elevation of the individual from the ranks of the people. The Industrial Exhibition affords one means of facilitating this union; it is, or may become an "Inventor's Mart," as suggested by that eminent philanthropist Mathew Davenport Hill, in his letter to the Mayor of Birmingham (4th Nov. 1850), "as the best or only practicable means of affording the inventor opportunity of negotiating with the capitalist, and to the capitalist the means of forming a just estimate of the value of any invention."*

It is said by those who object to, or view with little favour, the protection to and property in designs and inventions the subjects of registration or of patents, that each author or inventor should trust to the position which his skill will confer upon him with the public, or with his employer; that, in the majority of cases, he will gain as much, or more, by trusting to that than to the rights or property with which the law may invest him. This may be true; but however true, is it any reason for compelling or constraining him to continue in this state of dependence? Does the remuneration or reward so attained, in the few cases in which it is attained, bear in the majority of cases any adequate relation to the acquisition of the capitalist? Can any reason be assigned why the law should not recognise property in those creations which had no anterior existence,

to which as the offspring of the individual brain the right and claim, until published or disclosed, is the strongest possible, namely, the absolute control and possession of its author? This control and possession being parted with, the power of copying and reproducing each object of industry, in spite of and without the consent of the author, is conferred on each visitor to the exhibition without restriction or restraint. Is it for the interest of industrial exhibitions that such a state of things should continue? It can hardly be supposed that the opportunity of exhibiting new designs and products would not be a strong incentive and inducement to the production and exhibition of objects of interest to be so submitted to the judgment of competent persons, if some portion of the benefit to result from a favourable judgment were reserved to the exhibitor. As the law now stands such future benefit cannot be received without the preliminary steps for registration under the Designs Act, or for provisional protection under the Patent Law Amendment Act, 1852, having been taken. The cost of such steps would, in the majority of cases, be absolutely prohibitory; it is one of the prominent defects of our present laws for acquiring property in design and invention, that a substantial expenditure, and one which in many cases is prohibitory, must be incurred before any adequate trial or judgment can be had. The remedy is very simple. Let an Act be passed allowing the place of such industrial exhibition to be registered at the Board of Trade or other office; let it be enacted that the author or inventor of any design or invention first published at such exhibition shall be entitled to all the privileges of the laws relating to property in designs and inventions, as from the date of the opening of such exhibition, provided advantage be taken thereof within one month after the close of the exhibition. Under this state of the law fair and reasonable opportunity would be given for the fusion or union of the capital of intellect and that of wealth, and one step in advance would be taken for removing the barrier now placed to the progress of intellectual or skilled labour in any new domain of industry.

The course proposed has the authority of precedent. In the Session of 1851 was passed (14 Vict., c. 8). "An Act to extend the Provisions of the 'Designs Act, 1850,' and to give Protection from Piracy to Persons exhibiting new Inventions in the Exhibition of the Works of Industry of all Nations in One thousand eight hundred and fifty-one," and in the Session of 1861 an Act, with the same object, and recognising the same principles, was also passed for the International Exhibition of 1862. It may be a question whether the details and machinery of those Acts might not be modified with advantage, but their principle is the same as is now suggested and contended for, and appears to me both just and politic. The working of the first of these Acts, called "The Protection of Inventions Act, 1851," afforded strong evidence of how much might be done towards protecting inventors against their own ignorance. Some plan or system for the identification of the design or invention is necessary. The identification of a design presents no difficulty, but the proper identification of an invention is not without difficulty, and according to the plan adopted in that Act a certificate of the sufficiency of the description of the invention to be registered under the provisions of the Designs Act is a condition precedent to obtaining the benefit of protection for and property in the invention. Although there was no power of refusal of such certificate if the description was adequate, upwards of 70 persons out of about 600 applications, or more than one-tenth, declined to proceed further on the suggestion of myself (to whom, in conjunction with your secretary, Mr. Le Neve Foster, the administration of that Act was entrusted), that, looking at the character of what was proposed it could hardly be worth while to proceed any further with the registration. The principle of the provisional registration then first adopted was carried out in the Patent Law Amendment Act, 1852, the Act of the next session,

* See evidence on Patent Law before Select Committee of House of Lords. Session, 1851.

and is now known as the Provisional Specification, the sufficiency of which is certified by the Law Officers of the Crown. The Royal Commissioners, in their report just issued, have recommended that the application for a patent should be subjected to a preliminary examination as to novelty. The protected exhibitions now contended for would at once bring to the test the merits as well as the novelty of designs and inventions, and thus in effect go beyond what is recommended by the Royal Commissioners as one of the improvements of the present patent system, thus tending to diminish those inconveniences which the Royal Commissioners consider as incident to any patent system, and as the price which the public pay for any patent law. The course now suggested assumes the justice and expediency of some patent law, that is, of some mode of rewarding or remunerating those who are the first to publish new designs and inventions applicable to the industrial arts. That the present patent law admits of, nay requires great improvement cannot be denied; the evils of the indiscriminate issue of patents are seen in the litigation which is the subject of such just complaint. This very litigation is one of the indications of the overwhelming power of capital. Hitherto the patent system of this country has been an unequal struggle between the inventor and the capitalist, in which the latter has had the advantage. In what position would inventors be placed if left absolutely at the mercy of the capitalist, as would be the case if they could acquire no right in their invention to be protected by the strong arm of the law? The real difficulty lies in the mode of protecting the property which the law recognises. Is it a proper course to refuse a recognition of property because of the difficulty of protecting it? Why should not the attempt be made in the direction and manner indicated by the authors of the Patent Law Amendment Act 1852, which, as regards all remedial measures, has hitherto been a dead measure? To pursue this question further would be to travel rather out of the present subject, but these considerations will naturally arise when the claims of the working classes to property in the products of their industry are insisted on. If such property cannot be secured and protected better than hitherto, there will practically be one law for the rich and another for the poor. The Royal Commissioners have recommended that the adjudication of these rights should be left to a judge, aided by skilled assessors; a suggestion which has been repeatedly made and supported by the authority of those most conversant with the working of the patent system.

The promoters of industrial exhibitions will add greatly to the claims which they have on public gratitude, by directing and concentrating attention on the means by which practical and available protection can be secured for the creations which these exhibitions call forth for the first time. The exponent of an existing trade may find his reward and remuneration in the publicity given to the labour and capital under his direction and control, but the ingenious artist or artizan is in a very different position, and must rely on the protection of the law for that independence to which he is entitled.

It lies on the opponents of the views now contended for to show why there is to be property in and protection for a design and not for an invention. The inherent difficulty of the two subjects is matter of degree and administration. It is hardly creditable to our national character that the admitted abuses should be permitted to continue, without even the attempt to apply some of the obvious remedies which have been not only suggested and recommended, but actually provided for by the legislature.

It also lies on the objectors to the existing system, as those who contend that an exclusive privilege is an inconvenient mode of reward, to point out a better. Such a privilege as I endeavoured to show in my last communication to the Society,* was no violation of the principles of free

trade, inasmuch as it was only the means, the best hitherto devised, of creating and calling into existence the trade which when so created would be free after the limited terms thought necessary for such creation. If the term is longer than necessary, shorten it. This the system of periodical payments practically does. If the exclusiveness creates any practical inconvenience, let the public have that which the Royal Commissioners recommend that the Crown should have, in the right of purchasing a license for a sum to be settled, in case of difference, by arbitration.

Upwards of twenty years have elapsed since in this room, and on every convenient occasion, I have dwelt on the evils of the system, and pointed out the remedies now suggested; those evils are mainly defects of administration. To cut the Gordian knot by abolition is a remedy not likely to meet with favour until other remedies have been exhausted.

The claims of the author, in whatever department his intellectual capital may be invested, are, to my mind, stronger than the claims of the possessor of a transmitted inheritance, however considerations of public policy or expediency may allocate the relative claims of its possessors; and if circumstances exclude any considerable portion of the people from one description of property, do not deny to them the enjoyment of that which they have the power to create for themselves.

DISCUSSION.

Mr. CAMPIN was glad to find that Mr. Webster had touched upon the general question of protection to inventions in his paper, because the special subject of protection at Industrial Exhibitions must be treated as part of the larger question of the amendment of the existing patent laws. It appeared to him that if they gave protection to exhibitors, and then left them to the tender mercies of the Patent Office in the state it was now, they did but little for their benefit, because it was next to impossible for the great majority of exhibitors at Industrial Exhibitions to pay the successive £5, £50, and £100 fees necessary to secure patents under the present system. Moreover, he was disposed to think that the period of one month suggested by Mr. Webster as that within which application for a patent must be made, was wholly inadequate for the purpose, but this was a mere matter of detail. There were some other points not taken up in the paper which he thought would add to the strength of the case. These exhibitions contained not only designs for articles of utility, but also artistic designs. It so happened, that, under the Copyright Act, in the procuring of which this Society was mainly instrumental, a man, at the cost of one shilling, could obtain a copyright for his life and seven years after his death, for an original drawing, painting, or photograph—the latter frequently not being the result of any original conception at all. It seemed strange that a man should be able to acquire a property in a production of that class on such easy terms, whilst if he turned his attention to a mechanical improvement or a chemical discovery, he could not obtain protection without incurring the heavy expenses of a patent. All who knew anything of the subject must agree that it was of vital importance to these industrial exhibitions, which were so widely extended throughout the country, that there should be some kind of protection for the original efforts of ingenuity which were there displayed, because he did not think mere honorary distinction would be a sufficient stimulus to promote the permanent success of those exhibitions.

Dr. PANKHURST had listened to Mr. Webster's paper with great interest, and he merely rose to suggest that they ought to distinguish between the general question as to the policy of a patent law and the particular question more especially treated in Mr. Webster's paper. If he understood him aright, Mr. Webster simply submitted the following question—that, assuming there ought to

* See *Journal*, April 22, 1864.

be property in and protection for designs and inventions, and assuming the policy of the two special acts which were passed to protect such inventions and designs in the case of the two International Exhibitions, on what ground could they withhold such protection in the case of the numerous industrial exhibitions now being held in various parts of the country, the importance and value of which were becoming more and more appreciated? He could not resist the force of the position which Mr. Webster sought to establish. As a matter of justice and right it was quite clear that a man who exhibited an invention under those circumstances ought to be protected by some such plan as that now suggested. That, however, would not relieve him from the difficulties in which he would be placed when the invention, if it were a valuable one, became the subject of contest between himself and the capitalist, a difficulty which he was afraid they could not entirely get over. Whether the plan suggested by the Patent Commissioners might relieve the poor man from the unequal burden of this contest he was not prepared to say. The purpose for which he rose was to express his approval of the simple proposition contained in the paper, and on the grounds of analogy and consistency, as well as plain justice, he conceived some such plan as that suggested ought to be adopted.

Mr. F. J. BRAMWELL would have been glad, before addressing the meeting, to have heard some of the views advocated on the other side of the question. He would say, at the outset, he was in favour of protection to inventors. Mr. Webster had proposed, and the two previous speakers had supported the proposition, that if the protection afforded to inventions at the two Great Exhibitions in this country was right in principle, the same should be afforded in other exhibitions of a cognate character. The proposition extended to inventions only, inasmuch as designs were already protected by legislative enactment. When they came to inventions it was a matter of greater difficulty. Mr. Webster proposed that the protection should be extended to one month after the closing of the exhibition; but he (Mr. Bramwell) thought the inventor should be required to deposit what might be called a provisional specification with his invention; and unless that document was very carefully drawn there would be considerable difficulty. It might be the case that an invention contained some things which were old and some which were quite new; and if a man said the model he exhibited was the thing for which he claimed protection, and did not at the same time furnish proper particulars, there would be great difficulty in giving him a patent, even if he could afford to pay for one at the present high rate, which, in his (Mr. Bramwell's) opinion, might with advantage be lowered. Allusion had been made to the letter of Mr. M. D. Hill, suggesting that these exhibitions should be regarded as "inventors' marts;" and no doubt that was the very thing required. A man might produce an excellent invention, but at the same time be without the means of introducing it to the world; and even if he had connections which would serve that purpose, he might hesitate to bring his invention before them without protection. The great difficulty a working man experienced was to get his invention considered and appreciated by capitalists. With regard to the general question as to the policy of a patent law, it might be said that those who were opposed to protection consisted of two classes—those who admitted the necessity for a law of copyright, and those (a small class) who went to the extent of advocating the abolition even of the copyright in books, as well as of the patent law. He had formerly heard a well-known Professor of Political Economy advocate the abolition of protection for manufactures, and the retention of it for designs and books; but he had since heard the same gentleman declare the advance which had taken place in his opinions, which now went to the extent of abolishing copyright altogether. There was at least a

consistency in this, though how anyone could maintain such a doctrine he (Mr. Bramwell) was unable to understand. There was, however, great inconsistency in those who would give protection to a man who designed a pattern for a carpet, but would give no protection to the man who invented the loom in which the design was woven. These were the two classes who opposed the protection to inventions. What were the grounds on which this opposition was supported? People did not, as a rule, consider the actual manner in which an invention was born and brought to light. They started with the assumption that if anything good was invented everybody would use it if it were not hampered by a royalty. If, however, they looked through the most meritorious inventions, what did they find to be the fact? A specification of the invention was deposited; but there was utter apathy on the part of those to whom the invention would be most valuable, and the patentee was obliged to spend years of time and a great deal of money in order to induce people to take up a thing which was for their benefit. He ventured to say that ninety-nine out of a hundred useful and good inventions had lain dormant for years before any person would take them up. In illustration of this assertion Mr. Bramwell mentioned the case of the fish-joint for rails, which, he said, was now acknowledged to be worth £150,000 a-year to the railways of this country, but it required six years' unremitting exertion on the part of the inventor before he could get the railway companies to use it at all, although the royalty demanded was not large. That was sufficient proof of the lack of eagerness on the part of the public to take up really good and valuable inventions. He firmly believed that patents, so far from being an obstruction to invention, stimulated it. He would not stay to go into the subject of the justice of protection, or of the right of the inventor to it, for political economy did not recognise such things as justice and right, but only acknowledged the force of expediency. He would, however, say that it was expedient for the community that protection should be afforded to inventors. On the other side of the question it was argued—"Do not protect inventors by patents, but let the inventor obtain his reward by the fame he achieves for himself." Others asserted that his reward would come in the ordinary course of trade, through the development of the invention itself, and from the inventor becoming the manufacturer of the article. Dismissing at once the idea that the "glory" of an invention would act as a stimulus to inventors in the present strictly practical age, he would dwell for a moment on the next argument, that inventors should become manufacturers. In answer to this they had the fact before them that the great substantive inventions of this country were made not by persons in that particular class of manufacture, but by outsiders. A man who had practised a considerable business for a number of years had got his mind in a particular groove, and he preferred to go on in the way he had been long accustomed to. He might make some little difference in detail, but he was not the person to look to for great substantive improvements. Taking the great instances of inventions of later ages, they found that Watt, the inventor of the then called fire-engine, was by trade a watchmaker; that Arkwright, the inventor of the spinning mule, was a barber; that the inventor of the power-loom was a clergyman; that the inventor of the screw-propeller (or at least the man who brought it into practical use) was a farmer; and the inventor of the electric telegraph, a musical instrument maker. This was sufficient to show that the great and sterling inventions did not emanate from those who were engaged in the particular trade to which those inventions were applicable, and under such circumstances he asked, what would be the condition of the inventor without protection? A further objection to the absence of protection to inventors was, that it would lead us back again to the old secret systems in the workshops, as

that would then be the only protection an inventor could avail himself of. Crompton, the inventor of the mule, found a ready market for all the yarn he could make, and the question arose how did he make it of that quality? To preserve his secret he barred up his windows and barricaded himself in his factory. Then people climbed into trees to overlook him; others tried to tamper with his workmen, till at last he agreed to dispose of his secret to twelve persons, but only one out of the twelve paid him the price agreed upon. That was a fair example of the evils that would arise if protection were abolished. A favourite argument against the patent law, as it now existed, was, that out of the 3,000 odd patents applied for every year, more than 1,000 were allowed to expire at the end of six months, and thus became the property of the public; that at the end of two years and a half more another 1,000 dropped off; and that, comparatively, few out of the 3,000 paid the final fee of £100 for the full period of fourteen years. He believed it to be the fact that only about 6 per cent of all the patents taken out were carried to the point of paying the £100, and he was aware that was a stock objection against protection. But in his opinion the public were greatly benefited by such a state of things, as they had the advantage of the publication of this large number of inventions; and as the patents lapsed it could not be alleged that they were any obstruction to progress. He thought, however, the existing patent law was capable of great amendment and improvement. The great point to be enforced was, that every inventor should honestly and truly specify what his invention really was. He assumed the law never meant that it should be otherwise; but it might truly be said "the law was made of none effect;" inventors sheltered themselves under the elastic term "combination," which was in some cases carried to such an extent as to shut out many really useful and good inventions, inasmuch as there was a fear of infringing that which had already been specified under the convenient term "combination." He, considered unless a man specified what he wished to be protected in such definite terms as could be understood by persons of ordinary intelligence reading the specification, he ought not to receive protection, and if this were done a vast amount of the objections they had heard against the patent laws would be done away with.

Mr. W. HAWES said it was very difficult to treat a subject on broad and general principles, after it had been reduced by each successive speaker into a criticism of details. Those who objected to the patent laws justified their objections on the principle that the operation of these laws was unjust to the community, that they were calculated to deter and not to stimulate invention, and were in every respect injurious to the interests of the public. He took up the question on the broad principle whether the public really gained or lost by the operation of the patent laws. It was matter of history that the great majority of inventors were amongst the most unsuccessful men in the world, and that the parties who really benefited by the patent laws were those who speculated and traded in other people's inventions. The patent laws were evaded in every step of their progress; moreover, they could not be supported on the principles of political economy. He had been surprised at the remark of the last speaker, that political economy was based neither on right nor justice. Political economy, however, was a science of modern days, which had risen with civilization and with the progress of knowledge, and to say that that science was based neither on right nor justice, was an expression of opinion which he hoped would not be supported by the enlightened and educated classes of the kingdom. The whole liberties of the country were based upon the truth of political economy, and if those principles were not those of truth and justice, he would ask what principles they had to guide them in the administration of law and equity throughout this realm? They had had paraded before them a great many objections to the patent laws, but those objections had

not been urged upon sound principles. They had been told that there was protection by law for a design, while the machine by which the design was produced was unprotected. He thought such a statement was made in ignorance of the real state of the case. The law of copyright in books had been compared with the patent law. Now what was the operation of the law of copyright? The law of copyright in books prevented any one reprinting a book word for word as it was issued from the press by the author, but it did not prevent a man getting all the information he could out of the book and reproducing it in another form. He might use this information in every possible way, so that he did not absolutely reprint that identical book, or such a colourable imitation of it as would mislead the public. There was no similarity whatever between that and a law which said a man might take out a patent, dividing his claim, as had been explained by the last speaker, into five or six parts, and then if one of those parts were applied to a purpose quite dissimilar to the original intention of the patentee, it could be made the subject of legal proceedings. The two things, copyright in books and the patent law, were very dissimilar; and they had the authority of the first engineers, and of men most distinguished for discoveries in modern times, that improvements were impeded and checked by claims being made upon them for royalties for the use of certain parts of inventions, which it was said belonged to patents taken out for entirely distinct purposes. The designer of the *Great Eastern* steam-ship, in the application of modern improvements to uses to which they were never applied before, was perpetually fettered by claims for the alleged infringement of patents. He therefore said the patent laws checked invention, and did not benefit the real inventor. The case of Watt had been referred to, but it was notorious that he was nearly ruined by constant litigation in defending his patents, and it was only by the pecuniary assistance he received from Boulton that he was kept from sinking under the difficulties to which in this way he was exposed, by the operation of a law now supported in the interest of inventors. Many of the most important discoveries had never been patented. Gunpowder, paper, and glass, among many others, were discoveries which were never patented. These discoveries were made without a patent law, and the best practical inventions in all ages were those which had never been made the subjects of patents. Now what was the origin of the first patent law in this country? It was nothing more than an agreement between the throne and the subject to perpetuate monopolies. Previous to the time of James I. patents were granted by the Crown on certain pecuniary conditions, which led to enormous abuses. The people resented that state of things, and the result was the limited monopoly afforded by the patent laws. Patents were, however, admitted to be a monopoly, and he believed that no kind of monopoly whatever was useful or beneficial. The argument now used in support of the patent laws was the same as that urged in favour of the exclusion of foreign corn from this country. Nevertheless, the result had shown that unrestricted competition was a good thing for the community at large. Would they wish to go back again to the monopoly in corn by the farmers of England? He might illustrate his views at any length in this way. They must look at it, however, as a great national question, as a people's question, and not only as an inventor's question. Let them look at the statistics relating to patents. The 3,200 patents applied for in the year were reduced to 1,900 at the end of the first period; at the end of the second, or £50 period, they were reduced by 539; and proceeding further, they found that out of the whole number of patents taken out, but 140 were considered worth the payment of the £100 for the continuation of protection through the whole term of 14 years. They might look at the question in another point of view. Patents were frequently taken out for the purpose of advertising articles as being produced under letters patent. People

were apt to think a patented article must of necessity be superior to others, and he believed this was a means often resorted to to puff an inferior thing; but this would, of course, last only a limited time, when the patent was allowed to drop. This was the history of all but a small fraction of the patents taken out. To revert for a moment to the paper now before them, it was proposed by Mr. Webster to give some kind of protection to inventions brought before the public in the industrial exhibitions which were now taking place all over the country. If there was any good at all in the patent laws they would not stop where they were. If they encouraged the working classes of the country to expose their productions to the public eye in those exhibitions, he did not see how they could stop short of giving them an adequate amount of protection for those productions. Having passed Acts for the wealthy exhibitors in 1851 and 1862, they could not refuse the same protection to the exhibitors at these industrial exhibitions. The views of the late Mr. Brunel and also of Sir William Armstrong on the subject of the patent laws were well known; and although he (Mr. Hawes) had not always advocated the principles he now supported to the full extent he now did, yet he had done so in this room for the last fifteen years. But the supporters of the patent laws, feeling the difficulty of maintaining the existing laws, suggested, as a means of meeting the evils daily arising from the flood of sham and useless patents, that there should be such an examination of inventions as to ensure that no patent should be granted except for that which was absolutely new; but who was to be the judge to say whether a given mechanical, chemical, or scientific process was new? If such a tribunal as that were established, it was probable that many important discoveries would be nipped in the bud, and would be condemned as worthless. Where then were the persons to be found to say whether an invention was useful and also new? The only alternative left was to make the cost of patents so small that every one could obtain them. Looking, then, at all the difficulties of this important question, considering it from a national and not solely an inventor's point of view, he believed the time would arrive when all would admit that the patent law was an injury both to the public and to the inventor.

Mr. BRAMWELL explained, that what he intended to say was not that political economy was not based on truth and justice, but that it was not its province to deal with abstract justice or abstract right, but only with the question of public expediency.

Mr. LEVERSON was glad that the question had at length been referred to general principles by Mr. Hawes, for, the principle of giving property in inventions once conceded, all must concur in the admirable suggestions put forward by Mr. Webster in his able paper, but there was no use shutting our eyes to the fact that the real question to be determined was should any patent laws exist at all. And here he begged to state that, although ten years ago he had written upon this subject without hesitation, and with all the positiveness and dogmatism of a young man, he now, while entertaining precisely the same views, expressed them with greater diffidence, and entertained far more respect for what had to be said on the other side.* He begged at the outset, though agreeing with Mr. Bramwell in the main, to express his entire dissent from what he said on the subject of political economy. It was to political economy we owe our knowledge of the reasons for permitting any right of property at all, and it was to the principles and teachings of economic science to which recourse must be had, not only to support a property in thought, but all kinds of property. In answer to Mr. Hawes and his appeal to general principles, he would urge that all rights were the creatures of the law, and that the object in giving a right of property in the pro-

duce of labour was to give an inducement to labour, and that but for this we never could have emerged from the rude state of barbarism; moreover, the greatest inducement to labour, and at the same time the least, i.e., the cheapest, was to give to the producer the right to possess and to dispose of the produce of his labour. The law said if any one actually manufactured an article it became his property to keep or to dispose of—if he sold his labour that he should be entitled to his wages; the principle then of the right of property in the produce of labour once established, it lay upon those who desired to withdraw any particular produce of labour from the operation of that principle to establish a case for doing so. Did they propose any mode of remunerating the inventor for his invention, cheaper to the community, or affording a larger inducement to labour? No, they proposed, instead, to abolish the patent laws; that is to say, to destroy the property altogether, and this on the plea that the present laws were detrimental to inventors themselves. Of that the inventors were the best judges, and the answer to it was the immense number of patents of which we had heard. But we were told that it was not the inventor who was benefited by the present laws, but persons who had never invented at all. He admitted there was a great amount of truth in this, but the meaning of it was that the inventor, having had conferred on him a property (of which the abolition of the patent laws would deprive him), owing to causes presently to be mentioned, chose to exercise his right of property by parting with it; the right to dispose of his property being, he (Mr. Leverson) submitted, an element in its enjoyment. But what was the real cause of his having to dispose of his property for, often, so inadequate a consideration? Not the law, which gave him the property, but the defects in that law which only gave it on costly terms, and the still greater defects of that law—its expense, vexation, and delay in preserving to him his enjoyment of that property. Reference was made to certain grand inventions which had never been patented, but this certainly was not an argument upon general principles, and was best met by that great mass of inventions which were patented. As to the costly machinery of the patent office, this was paid for by the patentees, and not only so, but there was a large overplus; he claimed that the fees taken from inventors should be only sufficient to cover the expense of registration, and of affording that special kind of protection which the nature of the case demanded, and the necessity for which was one of the natural difficulties of the case. And here he begged to deprecate an appeal to the history of the patent laws, or to the history of any other law as being supposed to afford an argument either for or against it. This was not a question of an agreement between the crown and people; the question was not one of history, but of social science and of jurisprudence. Was it or was it not desirable in the interests of society that this or that right should be granted by the law? This appeal to antiquity was the more to be deprecated from the peculiar mode in which our laws and civilisation had grown up. Our neighbours (the French), having an accumulated mass of evils, got rid of them by overturning the social fabric and commenced building up a new one; we, on the contrary, as we progressed from barbarism, amended here and amended there, leaving or retaining such bits of good (and often a great deal of bad) as had been introduced into the mass, and in this way the patents granted by the Crown having supplied a want felt by society, viz., the right of property in inventions, were retained. That this peculiar species of property, viz., property in thought, was more difficult to protect than any other was true, but the way to remedy this was not to say, "We won't give any property or protection at all," but to devise proper means to give the most effectual security possible. The real difficulty—the real defect—lay in the law, and to remedy this, reliance must not be placed on the lawyers—they would afford no help; but here the public

* "Copyright and Patents, or Property in Thought." By Montague R. Leverson.

must help themselves, and in this the Society of Arts could do great service. By the present vexatious, dilatory, and expensive system of procedure justice was not done, the expense, vexation, and delay being often a greater injustice than the original wrong. If a rational system of litigation were to be established, it would be found that the greater part of the evils complained of in this, as in every other department of law, would disappear, and all or nearly all Mr. Hawes's objections to the patent laws would vanish, they being, in fact, the results of the defects of legal procedure rather than of any real difficulty in the nature of the subject. If, instead of the present system of barbarous jargon, absurdities and fictions, when A complained of B, he were to complain in person to the judge, and the judge were to summon B before him, once the parties brought face to face before the judge, nine out of every ten disputes would be immediately determined. With regard to patents, the cry of monopoly was raised. Of course, all property was a monopoly. If this coat was his, and he was to have a monopoly of wearing it, so did an invention belong to the inventor, and he ought to have a monopoly in it. The owner of the coat had a right to the monopoly—the owner of the invention had a right to the monopoly also. The law, and the law alone, gave the one, and he hoped the law would never cease to give the other.

Mr. MURPHY, as one who had been largely engaged in the organization of Industrial Exhibitions in the metropolis, desired to express his deep obligations to the Society for affording this opportunity of ventilating a question of so much interest and importance at the present moment. He considered that the principle which was applied in the case of the two Great Exhibitions, and which was about to be extended to the Dublin Exhibition, ought fairly to be applied to Working Men's Exhibitions. At the present time inventions shown at these Industrial Exhibitions were so entirely without protection that any person was at liberty to take a sketch and make the best use he could of any article there exhibited, from which, however, the articles in the Great Exhibition were protected by a special enactment of the legislature. He wished to state that a deputation on this subject to Mr. Milner Gibson had been received in a manner which led to the belief that the measure of protection sought for in these cases would be afforded.

Mr. G. F. WILSON, F.R.S., said the arguments on both sides of the question had been so fully entered into by Mr. Bramwell and Mr. Hawes, that he would only refer to one point on which he especially disagreed with the latter gentleman. It had been his fate to have been thrown a good deal in the way of patents, both as a patentee himself and as having received a good deal of annoyance from the patents of others; and with a full knowledge of obstructive patents in his mind he would say that a great number of inventions could never have been carried out to anything like perfection without some such protection as was afforded by patents. Therefore, on the broad view of the subject, he considered patents were a benefit to the community. Then there was the matter of the temptation to work in secrecy. In many trades, some years ago, secret working was carried on to a great extent, and the evils of this were well known. If protection were abolished this system would no doubt be returned to, and there were many processes, such, for instance, as the manufacture of magenta dyes, which could have been thus carried on. How much advantage would the public have lost by this in the way of improvement? There would not then have been, as had now been the case, many minds brought to bear upon the subject, and the variety of colour and improved processes now in use would have long remained undiscovered.

After a few words from Mr. MURDOCH,

Mr. CLARKSON suggested that a useful hint on this subject might be gained from the practice of other countries. In France a patent could be taken out for £4, in Belgium for £10, and the American system had been found to

work well generally. He could confirm the statement of Mr. Bramwell as to the difficulty of getting an invention practically before the public, inasmuch as he had himself been fifteen years trying to introduce an invention, and had been obliged to obtain a prolongation of the protection. In one instance in particular, in which a saving of many thousands a year could be effected in a particular branch of manufacture, the invention was as yet only in the infancy of its practical application. He confessed he had no great faith in "glory" as a stimulus to invention.

The CHAIRMAN, in closing the discussion, said he would trouble the meeting with very few observations. He might say that the paper before them originated in the general desire that was entertained that the *working men* who exhibited their productions at the different exhibitions in London and in the country should have protection for the novelties they placed before the public. Such a desire was only reasonable, and he thought the legislature was in duty bound to accord that provisional protection at such a cost as would be within the means of the *working classes*. The discussion had naturally extended to the consideration of the general question of protection by patents. Mr. Bramwell, he thought, had pretty nearly exhausted the arguments in favour of patents, and some of the objections of Mr. Hawes were doubtless worthy of consideration. He would confess that, as far as inventors were concerned, he believed few reaped anything like a proper reward for their inventions, and in the generality of cases he thought they did not benefit by the patent law. But if the question were asked, who did get the benefit? his answer was, the public; and if they could not support patents on public grounds, the sooner they were abolished the better. It required more than mere invention to give a thing stability. It required experiments, frequently of an expensive character, and a large outlay of capital before it could be even fairly tested, because tests which succeeded on a small scale often failed when applied commercially on a large scale. The assistance of the capitalist would not be given, if it were not for protection; indeed, the most important inventions this country had witnessed would never have been brought to light but for the patent laws. He believed it was the invention of the country, the capital which developed it, and the protection which the patent laws afforded, which enabled us so greatly to multiply our resources and extend our enterprise. They must not be unmindful of the obstructions which stood in the way of the practical application of many great inventions. For instance, a manufacturer of a certain textile fabric, employing a thousand looms, might be told by an inventor that he could give him machinery that should weave for 2d. a yard what he now paid 10d. a yard for. The reply of the manufacturer would be, "What am I to do with all my old plant, in which a great portion of my capital is invested? Besides, I don't believe it is practicable to do what you say." The inventor would go to another manufacturer and meet with the same reception. Thus the invention might lie dormant for years, until some one, probably unconnected with the trade, found the capital to bring it into operation, and made a large profit out of it. But it was not to be supposed that this would be done without the protection of the patent law. He thought the expense of provisional protection should be 5s. instead of £5, and to a poor man, to whom £1 was of consequence, it might be reduced to 1s., especially when they saw how many patents fell through before six months expired. They had been told of the great expenses in connection with the Patent office, but these were paid by inventors, and not by the public, whilst the public reaped the full advantage of the great number of specifications which came before the world when the patents lapsed. He concluded by moving a vote of thanks to Mr. Webster for his very able paper.

The vote of thanks having been passed,

Mr. WEBSTER expressed his acknowledgments for the way in which his communication had been received. He

must say, as regarded the speech of Mr. Hawes in opposition to patents, which was characterised by that gentleman's usual ability in anything he undertook, he could not but look upon it as a tissue of fallacies throughout. Was there any analogy between the protection of an invention and the maintenance of restrictive duties on the import of a produce like corn? Was it not a delusion to talk of a comparison between that which gave a privilege for creating a thing, and that which caused the exclusion of a commodity already existing such as corn? The so-called monopolies which were abolished by the Act of James I., were monopolies in the sale of certain well-known articles, which were then restricted to certain privileged persons, but there was no analogy between the two cases. One defect in the present law was permitting actions too readily against mere sellers of articles. Neither the seller nor user, except he was in collusion with the manufacturer, ought to be subject to action for infringement, because there were many innocent usings and sellings, and no doubt, in many cases, black mail was levied on such parties rather than stand the fight of a patent cause in the Courts. One of the improvements which he hoped to see in the law was, that there should be no action for infringement, except under the fiat of some competent person that there were reasonable grounds of action. They had been told about the obstructiveness of patents, and that in many cases they were used merely for puffing an article, but they must be considered a rather expensive mode of puffing. In reference to the argument drawn from the fact that so large a proportion of patents were allowed to lapse without running their full term, it must be remembered that persons having patents often did not go on paying because they might have improvements which would render the former patent nugatory; and so it was often no argument against the value of an invention to say that the patent was suffered to lapse. Then again, it was argued that the invention of gunpowder was not patented; but everything must have a beginning, and the fact that gunpowder, glass and paper had not been patented was no answer to the rapid progress that had been made in various manufactures under the protection of the patent law. Nothing could be more true than the statement that most of the great inventions did not emanate from the persons engaged in that particular manufacture. A person who had a large capital in machinery was generally the last to desire improvement; he would be inclined to suppress invention, and that was one form of obstructiveness which inventors had to contend against. He thought what was wanted in the present day was a concise history of the inventions that had grown up under the system of patents, which would form a valuable contribution to the study of the subject. With regard to the preliminary examination of inventions, he thought in many cases it would save imaginary inventors from the consequences of their own ignorance, though the power of rejection should not be absolute. He hoped this subject would be followed up in the interest of the working man, for it was a working man's question. They could not expect a reform in the patent system to come through the lawyers any more than through the capitalists, as both classes were interested in maintaining the existing state of things.

Proceedings of Institutions.

KNUTSFORD SOCIETY, FOR READINGS, MUSIC, AND LECTURES.—The committee having found that the establishment of penny readings in the town has been attended with more success than could reasonably have been expected, have made arrangements for a course of lectures in addition to the readings. Amongst the subjects are—"Freedom's Battle; or, the Struggle of a Thousand Years," by Mr. John Johnson, of Liverpool; "Jerusalem, past, present, and future,"

by the Rev. John Broad, St. George's, Newcastle-under-Lyne; "The Curiosities of Insect Structure," by Mr. John Withington, Blackburn; and "The Bow of the Past, and the Rifle of the Future," by the Rev. Samuel Doria, of Wigan. The admission is, in all cases, one penny each, but tickets for reserved seats, at sixpence, are also issued. No donations are solicited, because the system of penny payments for admission renders the Society self-supporting, and avoids the objectionable features of free lectures and readings.

MARLBOROUGH READING AND MUTUAL IMPROVEMENT SOCIETY.—Mrs. Balfour recently gave a lecture here on "Illustrious Prisoners, and what prison hours have done for the world." Out of the wide field comprised in the title, Cervantes, Sir Walter Raleigh, John Bunyan, and a pathetic history of the escape of Lord Nithesdale from prison and a scaffold, were the chief subjects chosen. The lecture appeared to be much appreciated by the audience.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.—The second annual meeting of this association was held on Wednesday, the 8th inst., at the house of the Society of Arts. Earl Granville, K.G., President of the Association, occupied the chair, and was accompanied by Lord Feversham, Sir T. Phillips, Mr. W. Cotton, Archdeacon Utterton, Revs. H. White, Wallis, Mr. F. S. Powell, M.P., Mr. B. Shaw, and others. The report showed that the work of the Association had greatly increased during the past year. The number of candidates in the elementary examinations had been more than doubled, while in the examinations in religious knowledge, held under the direction of the Bishops of London and Winchester, the advance had been still greater. Several clergymen and managers of schools and institutes had borne testimony to the value of the Society's operations. During the year a number of educational classes, on the principle of those of the London Mechanics' Institution and City of London College, had been established in the district. Female education had formed an important part of the work of the Association. Conferences on subjects connected with adult education had been held, which had been well attended. In order to bring the subject of Adult Education under the notice of the public generally, meetings had been held in different parts of the metropolis, at which deputations from the Committee attended to explain the operations of the Association. Physical education had engaged the attention of the Committee, and at a *fête* held at the Crystal Palace, on the 27th of June, prizes to the amount of twenty guineas were awarded to successful competitors in athletic sports, and delivered to them in the orchestra of the Crystal Palace, by Mr. Harry Chester, the Chairman of the Committee. The receipts of the Association amounted to £184 0s. 5d., and the expenditure to £190 3s. 11d. The report concluded with an earnest appeal for increased support. Earl Granville said that sitting in that room, where he had often had the pleasure of meeting a portion of the company then present, he could not help advertising in few words to the Society of Arts, to which the room belonged. For more than a hundred years it had been at work encouraging education in different forms throughout this country. There was no doubt that its proceedings had been marked to a singular degree by that stubborn energy which was the characteristic of the English nation; and that a great amount of benefit had been conferred on the arts and manufactures of this country by that society. It was soon after the Great Exhibition of 1851, that the step was taken by the Society of Arts of forming a union of institutes throughout the country, and, when thus united, it obtained for them the legislative powers by which their property was protected. It then became desirable to enlarge and liberalise those Institutions, and make them more active, more agreeable, and more instructive to those connected with them. It was found that, in order to give full effect to the educational objects of those Institutions, it was also necessary to establish some system of examinations, and he thought this was a

most wise step on the part of the Society. He believed the Metropolitan Association (which was in Union with the Society) was established because it was found that, thickly populated as this metropolis was, and great as was the amount of activity that prevailed among all classes, yet the attendance at these examinations was much less numerous than in other parts of the kingdom. The objects the Society had in view appeared to be to give an opportunity to those who were chiefly engaged in labour to redeem time mis-spent, or to continue the advantages of education, which they had only been able to receive up to a limited period of their lives. The advantages of education were said to be so obvious that it was unnecessary to urge them; still he would repeat his belief that knowledge was of the greatest advantage to every class of the community. He remembered that the late Prince Consort, when he used the words "knowledge is power," always added, "and enjoyment too." The Prince Consort, coming to this country as a foreigner, was in a difficult position. It was perfectly clear that if he had arrived here a perfectly idle and uninformed man, he might perhaps have been powerful for harm, but he would have been powerless for good, whereas they were aware that every year he gave increased encouragement to the social institutions, and aided the prosperity of this country. He had had the opportunity of observing his Royal Highness for many years, and it was quite remarkable to see what knowledge he possessed of almost every science in every department, and how he increased his enjoyment of everything that related to the fine arts, as well as to more practical pursuits. With regard to enjoyment, he remembered a great friend of his (Earl Granville's)—one of the best informed men in the House of Commons—telling him that his great love for reading, and his great pursuit of knowledge, had its origin in his poverty. He found reading so much cheaper than other amusements that he was driven into it, and not only had it taken him into the position he had attained, but it had given him the highest enjoyment, which no other pursuit afforded. The report alluded to the progress that had been made, but when it was considered that the metropolitan district contained three millions of inhabitants, a very small fraction of persons would be affected by the operations of the Society. Taking into consideration, however, the large number of persons who by their position were necessarily excluded from these examinations, and considering also the very natural reluctance of older men to subject themselves to attending examinations in competition with younger persons, they would not find the state of things nearly so discouraging as it appeared to be. He did not, at any rate, wish to discourage the older persons from devoting a great deal of time even to the elementary portions of education. Not long before his death, Lord Lyndhurst consulted Mr. Gladstone as to whether he was using the best Greek dictionary, as he was reading Homer, and derived great enjoyment from it. With regard to what was suggested as to female education, he could not but express his great pleasure at this portion of what the association had done. He thought it was highly encouraging to see that [the Princess of Wales had followed the example set to her by her illustrious mother and father-in-law, and had become the patroness of an Association such as this. The report made a touching appeal for help to so young a society and so useful an institution. He believed it to be unnecessary for him to say anything on the subject, because the fact that they were tending to stimulate education—that they were trying to urge young men to improve their prospects in this life, and, as he firmly believed, to fit them for another world—would be their strongest claim to assistance. He did not think Government could do much to aid this movement, but the principle of giving clerkships by examination certainly did exercise a valuable influence. In the department over which he had the honour to preside two candidates from the Society of Arts' Examinations had been successful, and in another depart-

ment there was a much larger number, and he was happy to state that every one of those persons was doing well, and some excellently well. Some difficulty had been raised against the system of competition; but he could vouch, from his own experience, that there was no comparison between the competitive and probationary systems. He might mention also that employers of labour attached great value to persons who had distinguished themselves in examinations of that kind. He concluded by expressing his hopes for the continued success of the Association. Archdeacon Utterton, in moving the publication of the report, recommended the system of examination as a means of inducing young persons to concentrate their attention on particular subjects. Sir Thos. Phillips seconded the resolution. On the motion of Mr. Powell, M.P., seconded by Mr. Shaw, the officers for the ensuing year were elected; and a vote of thanks to the chairman brought the proceedings to a close.

RICHMOND YOUNG MEN'S SOCIETY.—A most valuable encouragement has recently been given to this Society, by the kindness of Earl Russell in consenting to become its president. On Monday, the 16th January, a deputation of gentlemen connected with the Society, and consisting of the Rev. Mr. Ingram, the Rev. Mr. Webster, J. G. Bohn, Esq., W. J. Maxwell, Esq., H. Hill, Esq., C. Ellis, Esq., and others, waited upon Lord Russell, at his residence, Richmond-park, for the purpose of presenting him with an address of thanks. The deputation having been introduced by Mr. Bohn, Mr. Gouldsmith read the address, which was elegantly illuminated. In addition to a cordial expression of thanks, it briefly described the main objects of the Society, which are "the mental and spiritual improvement of its members by means of a library for circulation and reference, reading-rooms, classes for the study of the Scriptures, elocution, music, English and French literature, &c." and also paid a tribute to the eminent services of his lordship in the cause of social and political progress.—Earl RUSSELL, in reply, said "he was most happy to accept the presidency of the Society, and felt it an honour to be connected with so valuable an institution. It was a great motive with him, in undertaking this position, that the society regarded the religious interests of its members of paramount importance, and attached so much value to the circulation of a wholesome literature. It was also a source of great gratification to him that Richmond was likely to be benefited as Manchester and other towns had been, by the exertions of such a Society. He ventured to hope that the future labours of the particular institution represented by the deputation would be pregnant with the happiest results to this neighbourhood and the country at large." His lordship afterwards intimated his intention of appearing publicly in the capacity of president of the Society, at as early a date as should be found convenient. The fourteen years of the establishment of this Institution have witnessed a progressive increase in the number of its members (now scarcely fewer than 300), and a corresponding augmentation of its means.

ART SCHOOLS AND ART INSTRUCTION.

The following is the substance of the minute of the Committee of Council on Education, dated 9th February, presented to both Houses of Parliament by command of Her Majesty. It will be of interest to the Institutions in Union, as it opens up the means of aiding night classes for drawing, without requiring any connection with a School of Art:—

My Lords having given their attention to the report and resolutions of the select committee of the House of Commons on Schools of Art, to the suggestions made by individual members of the committee, to the evidence of the witnesses, and the letter of Mr. A. Beresford Hope, acting on behalf of certain art schools, as well as to

various memorials and documents which have been sent to the Science and Art Department from the local schools of art, observe that the resolutions of the Select Committee offer no recommendations respecting elementary instruction in drawing given in schools for the children of the labouring poor, or given to the masters and pupil teachers of such schools, or to adults taught in night classes, objects of the first importance which may be promoted independently of special Institutions constituted as Schools of Art.

All these objects having been matured by the Science and Art Department into a national system of art-instruction, have been supported by Parliament for several years, and have taken root as an effective and successful system which it is desirable should not be impaired, whatever changes it may be expedient to make in the administration of local Schools of Art proper.

The Science and Art Department has steadily borne in mind that national improvement in manufactures can only be secured by the existence of a healthy demand and supply of such manufactures, arising from the improved taste and knowledge of all classes of the community, and that this result could most effectually be obtained by placing the greatest variety of means of instruction within the reach of all as far as practicable. Elementary drawing is taught especially to children of the poor, and to adults in schools and Institutions which are not Schools of Art. Drawing, painting, and modelling are taught in schools of art; whilst fine examples of artworkmanship of all ages and countries and styles are exhibited for public instruction in a central museum which is open both day and night, under a more liberal system than exists, at present, in any other capital in Europe.

It has been the consistent aim of the Department so to regulate the expenditure of public money on these several means of instruction that, if it should be the pleasure of Parliament to reduce or withdraw its votes in any direction, the public might be induced to supply instruction in art by municipal or voluntary action.

The report of the Select Committee confirms generally the soundness and success of the department's policy, and suggests modifications which are calculated to extend the principles of self-reliance, and to simplify the relations between the Schools of Art and the Department. The principal recommendations of the report refer to local Schools of Art, in reference to which the committee recommend—(a) That local schools of art be left to establish themselves wherever they can take root, and to extend their operations to all classes of society, and to charge such fees as their managers may think suitable. (b) That no further grants be made in aid of buildings, renting, or repairing Schools of Art. (c) That no further grants be made in aid of purchasing examples to Schools of Art. (d) That it be a condition of Government aid, that a public examination of every aided School of Art be held annually, through the agency of its local committee, and that the results of such examination should be reported to the Department in such form as the Department may prescribe. (e) That fewer prizes and no medals should be given by the central Department, on local examinations of aided Schools of Art.

These suggestions clearly indicate the opinion of the Select Committee to be that Schools of Art should chiefly rely on their own resources and local exertions, being relieved from any Government control, and free to work according to the wishes and peculiar wants of each locality. This view entirely accords with the policy of the Department, which has always aimed gradually to render the Schools of Art less and less dependent on direct state assistance, and to make them self-acting and supporting. In 1851 the Parliamentary votes, paid direct to the local Schools of Art, amounted to £6,850 for 17 schools having 2,842 students, being an average cost of £2 8s. per student, whilst in 1863 the corresponding payments to the local Schools of Art amounted only to £4,005 for 90 schools, having 16,480 students, being an average of only

4s. 10d. per student. Had the Select Committee recommended a return to the system of payments on teachers' certificates the whole charge on the Department in respect of them would have been only £2,836. These payments are exclusive of the cost of the National Art Training School, annually amounting to £4,450, of payments on results for elementary teaching £1,104, on prizes £2,461, on prize-studentships £1,063, and on art pupil-teachers £1,961, objects which have exercised a most important but indirect influence on Schools of Art. The Department having thus succeeded in reducing the direct payments, the Select Committee has now recommended the abolition of most of the indirect sources of aid, and the conversion of all payments into one capitation grant to each school of art. There was a great advantage in this variety of aid, because such aid could be modified from time to time in any directions experience might suggest. The mode and extent of its application were under control and new applications of it could be introduced. My Lords consider that these various kinds of assistance and stimulus could not be wholly withdrawn without inflicting a serious blow on a system which by general consent at home, and especially abroad, is considered to have worked well.

The Select Committee having affirmed the public utility of Schools of Art, it must have been their opinion that these schools have so far established themselves in the country that they must have nearly reached the point of self-dependence, and would not be imperilled by the suggested changes. My Lords would themselves have hesitated to say that this point has altogether been reached at present, but they are not so convinced of the contrary as to assert that the modifications recommended by the Select Committee would be permanently injurious to the schools or might not be safely tried to a great extent.

My Lords entirely agree with the Select Committee in thinking that Schools of Art should be left to establish themselves wherever they can take root, and to charge such fees as their managers may think suitable. The obligation of teaching elementary drawing in poor schools or to artisans at 6d. a-week, as conditions of recognizing a School of Art, will therefore no longer remain in force; and the masters of the art schools will thus be relieved of the obligation of performing work which has been called unremunerative. A local School of Art, as distinguished from adult night classes for drawing, will hereafter be defined simply as an Institution which is applied exclusively to the teaching of art at all times, and not to other purposes. Every place will be the judge of its own wants, and the only condition for receiving any direct payments from the State will be that there must be night classes for artisans open three times a-week at fees within their reach, the amount being settled by the local committees, and that the teachers must have taken from the Department a certificate of competency either of the second or third grade. Mechanics' Institutes, Literary Institutions, and schools for general education will be free to establish night classes for adults to learn elementary drawing without incurring the expenses necessary for the special premises or outfit of a School of Art.

My Lords regret that the Select Committee recommended all aid to be withdrawn towards buildings for Schools of Art. The provision of a suitable building is the greatest of all difficulties in establishing such a school; the special requirements for proper lighting by day and night rooms for art instruction are rarely met with in existing structures, and it is generally necessary to construct rooms specially. Out of the 90 existing schools, very few indeed are quite suitable, and by far the cheapest are those in which a moderate aid from the Department has been obtained and the Department's experience has been followed in the plans. This aid has also been the means not only of eliciting local subscriptions to a much greater extent than would otherwise have been the case, but in some instances of causing buildings to be undertaken which

without such aid would not have been begun at all. It may also be observed that the legal obligations entered into by any place receiving a building grant afford a security for the permanence of Schools of Art which might otherwise be abandoned at a period of temporary depression. Schools of Art have memorialised their lordships against adopting this recommendation. My Lords feel bound, however, to adopt the recommendation of the Select Committee that all direct grants should be withdrawn in future; and they will promote the erection of suitable buildings by enabling masters of Schools of Art and local architects to visit the training school and profit by all the experience the Department possesses. No grants will be made in aid of renting or repairing any established School of Art, which must pay all charges for rent, taxes, and repairs.

In accordance with the recommendations of the Select Committee, no further grants will be made to Schools of Art as such in aid of purchasing examples of a high artistic character, but aid towards obtaining a few elementary examples to be used in the artisan night classes will be continued. Considering the loose and inaccurate style of drawing still prevailing and almost popular, my Lords question the policy of this recommendation, but they propose at least to give it a trial. The local Schools of Art will be free to select and use what examples they please, except only in the few instances of some descriptions of works to be sent up for the national competition.

All local examinations in art, both in Schools of Art and elsewhere, where elementary drawing is taught, except in training colleges, will be conducted, in future, as in schools of science, by local authorities and not by Government inspectors. No more local medals will be given in future by the Department, and the number of prizes of books and instruments will be reduced in accordance with the recommendations of the Select Committee.

With respect to the recommendation of the Select Committee that "payments to certificated art teachers should be so far assimilated to those made to teachers of science that a capitation payment should be made for every artisan student who has received 40 lessons within the year," my Lords have to remark, in the first place, that no capitation payments are or ever have been made to teachers of science, who are paid wholly on results after having given 40 lessons during the year; and in the second place, that no evidence was submitted to the Select Committee on the policy of applying a capitation grant for the instruction of artisans. A capitation grant on behalf of a school child may be defended on the ground that the child is unable itself to pay for its instruction. In night art-classes as well as in a School of Art the artisan must pay a fee for his instruction or he cannot obtain it, and his attendance is his own voluntary act for his own direct and immediate benefit. If the capitation were sufficiently high the artisan might be tempted by the remission of all fees, and perhaps even by receiving a share in the capitation grant, to record forty attendances unaccompanied by serious study. Any capitation grant, however low, becomes a premium to the artisan to pay less than he otherwise would, and is in opposition to a sound system which would rather aim to encourage him to pay the full price within his means. The point always to be borne in mind is, that if local Schools of Art are to take a permanent footing in this country, the work can only be accomplished by inducing those who derive benefit from them to support them adequately. A capitation grant would violate this principle and be fatal to self-support and voluntary exertion. The cost of any capitation grant would be great and beyond control. It may be inferred from certain documents that the Art masters would wish it to be about £2 a head. It will be obvious that the amount of capitation grant ought to be fixed, if at all, not with reference to the existing number of Schools of Art, and the number of artisans attending them at the present time, but with reference to any possible extension

of these numbers. The numbers of the industrial classes who might claim a capitation grant probably exceeds four millions. Although it is not likely that so large a number would be claimants for a capitation grant, still the numbers would probably be much too large to admit of any such amount of capitation grant as that suggested. A small capitation grant would not be worth all the trouble and the details of administration necessary. My Lords therefore arrive at the conclusion that they could not undertake the responsibility of recommending this mode of assistance to the consideration of Parliament. The proposed removal of the obligations to perform unremunerative work and of the restrictions as to examples, &c., places the art teachers in a better position than ordinary drawing masters. The art teachers are trained at the public cost, and are certificated as competent: they are relieved of the risk of finding suitable premises and costly examples; they may teach at any rate of fees, whilst pupils are attracted to them by Government examinations and prizes, National scholarships, and Free studentships. With advantages like these any direct payment from the State to the art master may be dispensed with. My Lords are clearly of opinion, that if any direct payments are to be made to Schools of Art at all, they must be of a character to be under strict control as to amount; that they must not create the expectation of vested rights, or prejudice the success of voluntary exertions, and that they must be capable of being easily modified and withdrawn as Parliament may desire.

My Lords consider that some direct payments may continue for the present to be made in respect of students trained locally as teachers, as national scholars, and as local prize students, and also in respect of making an annual report for the information of Parliament. Payments for affording elementary instruction to schoolmasters or pupil-teachers or to adults in night classes will be continued to Schools of Art if the Committee think fit to engage in this work.

As respects elementary instruction in drawing in schools for the poor, and in night classes for adults, my Lords do not consider that the objections against capitation payment in a School of Art apply to the children of the labouring poor in a national school. It is proposed to continue a low payment somewhat of the nature of a capitation payment on school children learning drawing, and to raise the present payment from 6d. to 1s. for each school child who passes an examination in elementary drawing. Graduated payments on results will continue in force. Aid in obtaining suitable examples of an elementary character will continue to be given as at present, as well as prizes to the children.

Payments and prizes for elementary instruction for pupil-teachers, schoolmasters, and adults taught in night classes will be continued, such payments being made only on results. Aid on elementary examples will continue to be given. And all teachers who have obtained the second grade certificate will be qualified to receive payments.

The local examinations in schools for the poor and night classes in Mechanics' Institutes and similar institutions will be conducted as in schools of Science by the local Committees, and not by inspectors, and the works will be sent up to the Department for examination. Elementary instruction in drawing will thus be put on a distinct basis of its own, and a separate vote will be proposed to Parliament for it. The managers of schools for the poor and of Mechanics' Institutes and other similar institutions will be able to take advantage of the government aid without having necessarily any connexion with a School of Art; but there will be no objection to any organization for such instruction and for examinations in connection with a School of Art, if the respective managers agree upon having them.

In future the Department will conduct all correspondence direct with the managers of Schools of Art, Mechanics' Institutes and other institutions, and schools for the labouring poor, and will make all payments to

them, and not to the masters as at present. The managers and the teachers will therefore be free to make their own arrangements for payment.

My Lords concur in the recommendations of the Select Committee that the National Art Training School should be maintained according to the evidence of all the witnesses, and propose that the national scholars chosen from local schools shall be increased in number.

In accordance with the recommendation by the Select Committee, there will be an annual national competition for prizes of books, instruments, and the like, among works produced both in night classes and in Schools of Art; and payments will be made to the managers of the schools or night classes from which the successful works have been sent. The national medallions will be discontinued, and a very few medals substituted for them. No School of Art will be obliged to send works to this competition; but if they elect to do so, they must in a part of the course follow certain prescribed examples, so as to subject the competition to an equal standard of judgment for the whole country. Artists will continue to be the judges of such works; but in cases where original designs for manufactures are sent, besides artists as judges, my Lords will consider the propriety of inviting the assistance of competent persons as representing the purchasers in the community.

My Lords will endeavour to render the collection of works of decorative art at South Kensington as useful as possible throughout the country, and with this object will revise the present regulations. They propose to relieve Schools of Art of all cost of transport, packing, and conducting the exhibitions, requiring only that suitable space be provided for the purpose by the locality at its own cost, and for a sufficient time to warrant the expense to the State.

The votes for the Museum at South Kensington, the Schools of Art, and for elementary instruction in drawing, will be kept distinct and laid before Parliament in greater detail than heretofore, and the cost of examples to be preserved in the Museum will be transferred to the estimate for the Museum.

Their Lordships think it right to observe that the cost of purchasing objects for the Museum is to be viewed not as an expenditure transferable to local Schools of Art, but is rather a national investment which has both an intrinsic value of its own, and one which even increases in value. This expenditure does not in any manner affect the amount of aid given to local Schools of Art which it is their Lordships' opinion should as far as possible have the character of voluntary and self-supporting institutions under local management, and always aim at that independence of State control which is so honourable a characteristic of the general feeling of this country.

The changes proposed will slightly diminish the total estimate for the Art Division of the Department in the present year, and if in the growth of the system any increase should take place in future years, it will probably be confined to the head of elementary instruction for the poor.

The schedule to the foregoing minute gives the payments on behalf of artisans and children of the labouring poor, proposed to be made by the Department in all cases to managers of schools and classes as follows:—

I.—To Schools of Art.

(a.) Five shillings for every artisan who pays fees for being taught in a night class held three times a week, and passes satisfactorily an annual examination in a given time, and a further sum of ten shillings for such artisan student if he submits for examination drawings executed by him during the previous year which are satisfactory.

(b.) Five pounds for free studentships will be allowed for every fifty artisans satisfactorily taught in night classes of Schools of Art.

(c.) Ten shillings for each artisan who submits for examination satisfactory works executed by him during

the year, eligible for national competition, and a further sum of ten shillings on behalf of each artisan student from whose works any are selected for national competition.

(d.) Five pounds for a national scholar, being an artisan or designer, admitted to the National Art Training School.

(e.) Ten pounds for every certificate taken by an art-teacher trained in the local school.

(f.) Ten pounds for the annual report, provided that artisan night classes are held, a free studentship obtained, and works sent to the national competition.

(g.) See also II.

II.—To Night Classes in Mechanics' Institutes and similar Associations, and National Schools, &c.

(a.) Five shillings for every artisan who pays fees for being taught in a night class held three times a week, and passes satisfactorily an annual examination of the second grade in a given time, and a further sum of ten shillings on such artisan student if he submits for examination drawings executed by him during the previous year which are satisfactory.

(b.) Ten shillings for each artisan who submits for examination satisfactory works executed by him during the year, eligible for national competition, and a further sum of ten shillings on behalf of each artisan student from whose works any are selected for national competition.

(c.) The teaching in night classes may be given in connexion with Schools of Art or not. Teachers must have taken second or third grade certificates.

III.—To Schools for the Labouring Poor.

(a.) One shilling for every child in a national or similar school taught drawing satisfactorily, with additional payments of two or three shillings for success. Managers of schools for the labouring poor are free to have the teaching of drawing given either in connexion with a School of Art, or by any teacher certificated in the second grade.

Managers of schools for the labouring poor and of night classes for artisans will be aided to the extent of 50 per cent. on examples for elementary drawing.

The above-mentioned payments are exclusive of prizes to be awarded to students themselves.

THE PATENT LAWS.

The following are the recommendations of the commissioners appointed to inquire into the working of the law relating to letters patent for inventions:—

“ 1. Your commissioners do not find that the present cost of obtaining letters patent is excessive, or the method of payment inconvenient; they do not therefore recommend any alteration of the present system on those points; but they think that patent fees should not be made to contribute to the general expenditure of the state until every reasonable requirement of the Patent Office has been satisfied. 2. They are unable to recommend a preliminary investigation into the merits of the invention for which a patent is claimed; but they advise that a careful inquiry be instituted under the direction of the law officers of the Crown as to whether there has been any previous documentary publication of the invention, either by grant of letters patent or otherwise; and if such publication have taken place, that the patent shall be refused. No evidence other than such documentary evidence should be admissible, and the reasons for the refusal to grant the patent should be certified by the law officers; an appeal from their decision should lie to the Lord Chancellor. 3. Your commissioners are of opinion that the present mode of trying the validity of patents is not conducted in a satisfactory manner.

That such trials ought to take place before a judge sitting with the aid of scientific assessors, but without a jury, unless at the desire of both parties to the suit or action. That such assessors ought to be selected by the judge in each case, and the remuneration to be paid them be

included in the costs of the suit and action, and provided for in such manner as the judge shall direct. That no special judge be appointed for the trial of patent cases, but the judges of law and equity be empowered to make rules by which one court should sit for trial of patent cases exclusively. That on such trial the judge, if sitting without a jury, decide questions of fact as well as of law. 4. That the granting of licences to use patented inventions ought not to be made compulsory. 5. That patents ought not to be granted to importers of foreign inventions. 6. That in no case ought the term for which a patent is granted to be extended beyond the original period of 14 years. 7. That in all patents hereafter to be granted a proviso shall be inserted to the effect that the Crown shall have the power to use any invention therein patented without previous licence or consent of the patentee, subject to payment of a sum to be fixed by the Treasury. 8. While, in the judgment of the commissioners, the changes above suggested will do something to mitigate the inconveniences now generally complained of by the public as incident to the working of the patent law, it is their opinion that these inconveniences cannot be wholly removed. They are, in their belief, inherent in the nature of a patent law, and must be considered as the price which the public consents to pay for the existence of such a law.

(Signed) "STANLEY, OVERSTONE, W. ERLE, W. P. WOOD, H. M. CAIRNS, H. WADDINGTON, W. R. GROVE, W. E. FORSTER, WM. FAIRBAIRN."

DUBLIN INTERNATIONAL EXHIBITION.

The allotments of space to exhibitors in the United Kingdom have been issued, but, owing to the space demanded being seven times in excess of the whole quantity at the disposal of the Executive Committee, it has been necessary to refuse many applicants and considerably reduce the demands of others. The Corporation of the City of London, the National Gallery, the Royal Academy, and numerous private individuals, lend pictures for exhibition. There will be a very fine display of furniture, most of the principal London makers exhibiting. Glass and china will also be well represented. Nottingham and other manufacturing towns will make a collective display. The British colonies will be creditably represented. Nova Scotia will have an admirable collection, the legislature having voted a large sum for the purpose. Canada and some of the other North American colonies will also be represented; and Natal and Mauritius intend to exhibit. The foreign contributions will be varied and attractive. The Emperor of the French has promised to send Sèvres china and other objects. Krupp, of Esson, will exhibit steel ordnance. A very fine collection of textiles is promised from Rhenish Prussia; lamps and bronzes from Stobwasser, of Berlin; pianos from Zurich, and other manufactures from Switzerland, as well as a good collection from Russia.

Fine Arts.

SOUTH KENSINGTON MUSEUM.—The Lords of the Committee of Council on Education have recently issued a minute, expressing their desire to obtain a design for the decoration of one of the large lunettes at the north end of the south court. The lunette is a semi-circle of eighteen feet radius, a strip of one foot six inches high being cut off the bottom by the skirting. The subject is to be an illustration (life-size) of workmanship in any decorative art or manufacture. Three artists will be invited to make suitable designs, for which the Department will pay £50 each. In addition to the artists to be named, artists of any country not specially invited can compete if they think fit to do so. Two sums of £50 and £25 will be paid respectively to the two artists, not named by the De-

partment, whose designs are chosen. The design ultimately adopted by the Department will be enlarged by students for execution in mosaic, life size, and the artist whose design is chosen for execution will be required to superintend the enlargement of the work and approve it, for which he will receive a further payment of £50. All the designs will be publicly exhibited. They are to be made to a prescribed scale, namely, within a lunette formed by the segment of a circle of one foot radius, cut off by a chord parallel to the diameter one inch above the diameter. Thus the segment will be of nearly two feet base, eleven inches high. The designs are to be sent in with a cipher, on or before the 15th June, 1865, addressed to the Secretary of the Science and Art Department, South Kensington, London, W. The names of the judges will be hereafter announced.

EXHIBITION OF DRAWINGS ON STAINED GLASS.—The valuable collection of drawings (above seven hundred), made by the late Mr. Charles Winston, will be exhibited next month, under the auspices of the Archaeological Institute, in the rooms of the Arundel Society. These drawings were made with the most scrupulous attention to accuracy of detail, truth of colour, and form. Doubtless such an exhibition will be very acceptable just now, as so much attention is being given to an art nearly lost. Some of Mr. Winston's friends and admirers are preparing to collect and publish, as a memorial of him, the papers on painted glass, &c., which he had communicated at various times to different societies of which he was a member; many of these have never before been published. The volume will be richly illustrated by many coloured plates from his original drawings, as well as wood engravings, which have been intrusted to Mr. Philip Delamotte, of King's College. This work will be published by Mr. Murray.

Commerce.

THE FRENCH TREATY AND ENGLISH SODA AND BLEACHING-POWDER.—The French Government have returned the following reply to representations which have been made to them, setting forth the injurious effect of the rate of duty leviable under the Anglo-French treaty, upon soda and bleaching-powder exported from this country into France:—"When in 1860 the import duties on the chemical productions in question were fixed at 13 per cent., and commencing from October the 1st, 1864, at 10 per cent. *ad valorem*, the French manufacturers felt considerable anxiety, which was subsequently justified by the great disparity between the cost of manufacture in England and in their own country; it was, indeed, only through the removal of the salt duty, and through strenuous exertions on their part, that they were enabled to sustain the competition of England. The difference between the price of coal in the two countries constitutes an advantage to the English manufacturers, 15 francs per ton on coal, or 60 francs per ton on soda ash, whilst the import duty is only 30 francs, or 41 francs, including the Excise duty. The cost of salt and of pyrites seems to be about the same in either country. But, apart from this, the documents published by the French Custom-house authorities show the exportation of sodas, not to mention 116 tons shipped to outports during the first three-quarters of this year, to have been unimportant, while, on the other hand, since the commencement of the present treaty, Great Britain has exported to France 3,190 tons of sulphate of soda, 1,983 tons of soda ash, and 2,586 tons of crystals of soda. Bleaching-powder, however, may possibly be in a better position to allow of an abatement in the import duty than soda-ash or crystals of soda, but it must be observed that in its manufacture, which is closely connected with that of soda, of which it utilises the principal residuary product, it is but reasonable to take into account the reductions on the last-named article. Besides, the importation of bleaching-powder, referred to by the petitioners, which

took place at the beginning of this year, was the result of an accidental state of affairs. At that period rags were exceedingly scarce, and large quantities of esparto grass and other similar materials were employed in England in the manufacture of paper, which considerably augmented the consumption of chemicals containing chlorine, and thus the price was raised to a point which permitted the French manufacturers to conclude some transactions, of a limited nature it is true, and which have entirely ceased since the month of August. Under these circumstances it has not been considered advisable to entertain the request of the Newcastle and Gateshead Chambers of Commerce."

RESIN IN FRANCE.—A new branch of industry is about to be commenced in the Morbihan, which it is expected will add considerably to the wealth of that province. The extraction of resin from the pine trees in the extensive forest of Lanvaux is to be carried on there on a grand scale. For that purpose several cargoes of earthenware cups have been imported at Vannes. The apparatus is extremely simple; each cup resembles a small flower-pot, with the difference that one of the sides is concave, so that it can be fixed against the tree to be tapped, so as to facilitate the flow of the liquid when the tree is pierced.

AMERICAN HOPS.—Twenty-four years ago the United States produced only 6,000 bales of hops. Ten years later, in 1849, the production had increased to 17,000 bales. The next decade shows a larger increase than in any other agricultural product, the growth of 1859 reaching 55,000 bales. The crop of 1862 was estimated at 80,000 bales, a maximum which has not since been attained. The yield of 1863 was estimated at 65,000 bales, while that of 1864 is stated at 45,000 bales.

PATENT LAWS.—The following remarks, extracted from the judgment of the Lord Chancellor, in the case of *Simpson v. Holliday*, merit the attention of inventors:—"Cases of this nature frequently give rise to complaints of the state of the law. It is, therefore, right to point out how entirely the plaintiff's failure has arisen from not availing himself of the salutary provisions of the existing statutes. The provisional specification proves that a valuable discovery had been partially made, but not matured, and that the true conditions on which it might become an invention of practical utility had not been ascertained. Six months are allowed by the law for maturing the invention and accurately ascertaining and stating it; but in this case there does not appear to have been any attempt by the patentee to improve his knowledge; for the complete specification is a mere repetition of the provisional. Lastly, the inefficiency of the cold process, and the dangerous language of the specification must have been known long prior to this suit, and yet there was no attempt to remove the objection, as might easily have been done by a disclaimer under the statutes."

MARINE RAILWAY ROUND THE FALLS OF NIAGARA.—At a recent meeting of the Detroit Board of Trade, the subject of a marine railway round Niagara Falls, for the transportation of vessels with their cargoes from Lake Erie to Lake Ontario, and *vice versa*, was brought up for consideration. The subject was suggested by a letter from Mr. Horace H. Day, who states that last summer he caused the proper surveys and plans to be made for a marine railway around the American side of Niagara Falls, adapted for transporting loaded vessels of all kinds of such tonnage as can be profitably employed in lake trade. This he proposes should be built as a substitute for a canal, and at a cost of about one-third. He asserts that it is practicable to pass vessels floating in the moveable locks from Lewiston to the Niagara River, above the falls, in less than two hours, with entire safety to ship and cargo, while the time of passing the necessary locks of a canal is estimated at from twelve to sixteen hours each way. This railway should (he says) have six rails of suitable construction, and with proper turn-outs, and different-sized locks for different-sized vessels. These locks are proposed to be wood and iron, with gates at each end.

Colonies.

NEW ZEALAND.—The coal obtained from Kawakawa mine, at the Bay of Islands, province of Auckland, is said to be of a first-rate character. To raise steam by means of the best coal from Newcastle the period of 1 hour and 45 minutes is required, while it has been found that for Kawakawa coal no more than 1 hour and 5 minutes is requisite. The province now possesses coal mines in various parts of the country.—The Auckland Gas Works are in a forward state. A capacious tank, for receiving the gas holder, is nearly completed; the diameter of the tank is 54 feet, the depth being 16 feet. A well, calculated to yield between 4,000 and 5,000 gallons in the 24 hours, has been sunk, after some considerable difficulty, experienced through the fact of the penetration being entirely through rock, to a depth of upwards of 200 feet. It has not been drilled in the usual manner with a screw, but with a jumper, which has been attached in lengths of wrought iron tubing, the same as a boring rod. The rock through which this well has been sunk consists of alternate strata of slate and freestone.—The bridge over the Waikonaitai stream is completed. It is of wood, and is about 400 feet in length, and 20 feet wide. The opening of the bridge is hailed by the inhabitants of the district as a great boon, many of them having suffered serious inconvenience from the impediments which previously existed to travelling.

COTTON AND SUGAR IN QUEENSLAND.—Notwithstanding the unfavourable circumstances which operated against the raising of cotton during last year, the crop bids fair to exceed that of all previous seasons, and it was expected that upwards of one hundred bales would be shipped. Three gins, driven by steam power, have been constantly at work. A portion of the cotton was grown on the plantation of the Manchester Cotton Company; another portion at Nerang Creek, by a private company, and the remainder is the produce of various farms in the neighbourhood of Brisbane and Ipswich. That from the plantation of the Manchester Cotton Company is of fine quality, and although portions of it have been somewhat stained and injured by wet and unfavourable weather, it is considered to be worth 5s. 6d. per lb. in the present state of the market. In addition to the above, there are ten bales of ginned cotton, from the plantation of the Cabulture Cotton Company. These facts speak for themselves. That such satisfactory results have been attained during the unfavourable circumstances of the past season, show that cotton can be grown there with every prospect of success. Messrs. Board and Sons have produced some very fine sugar-cane, and a sample of sugar manufactured by Mr. Buhot, prize essayist on sugar culture, at Maryborough, from canes grown by Mr. Eaton there, promises to be good, dry, and of a rich yellow description—worth there about £40 per ton. The means of manufacture were of an exceedingly simple and rough kind—an old patent mangle being the crusher, and a saucepan the boiler.

Obituary.

THE DUKE OF NORTHUMBERLAND died at Alnwick Castle on Sunday, the 12th instant. He was the youngest son of Hugh, the second duke, and was born in 1792. He married, in 1842, Lady Eleanor, eldest daughter of the Marquis of Westminster. In early life he entered the navy, and obtained the rank of post-captain in 1815. He saw, during ten years, considerable active service in the Mediterranean, but after obtaining his rank as captain he retired. In 1816 he was created a peer by the title of Baron Prudhoe, and sat in the House of Lords as such until he succeeded his brother, the third duke, in February, 1847. After leaving the navy, he devoted himself to travel, and with his friend Sir Gardner Wilkinson,

passed some years in Egypt and the Holy Land. In 1852, on the Earl of Derby being called upon to form an administration, he accepted the office of First Lord of the Admiralty. He was president of the Royal Institution of Great Britain, and of various other societies. Within the last few years he expended above £500,000 in improving the dwellings of the labourers on his estates. He was elected a member of the Society of Arts in 1814.

SIR JOHN HARE, F.G.S., F.S.A., a well-known citizen of Bristol, died recently at his French residence of Chateau d'Hardenet, near Boulogne. He was born in 1784, and was the head of the firm of John Hare and Co., floor-cloth manufacturers. He was chiefly notable for his connexion with the anti-slavery movement. In the heat of the discussions on this subject there was an election for Bristol, the candidates being Mr. James Evan Baillie, a whig, who supported the West Indian interest, and Mr. Edward Protheroe, a whig, who supported emancipation. Sir John Hare took an active part on behalf of Mr. Protheroe, and barely escaped with his life at one of the party banquets at Bristol, the Baillieites making a dead set at the Protheroites. Sir John was knighted in 1840, on the presentation of a congratulatory address from the city of Bristol on her Majesty's marriage. He was the owner of the ship *Cambria*, which is said to have saved the crew and the passengers (including the 31st Regiment) when the *Kent*, East Indiaman, was destroyed by fire in the Bay of Biscay. He was elected a member of the Society of Arts in 1861.

JOSEPH LIES, a Belgian painter, died recently of consumption, at the age of forty-three years. On the very day of his decease he finished a picture which he had in hand. Lies was of a truly artistic nature, learned, gentle, and sympathetic, and was endowed with great intelligence and a kind heart. He was much esteemed by the elder painter Ley, to whose instruction and influence he was much indebted in the earlier portion of his career. A portrait of one of Ley's children by Lies is considered the best work of this artist.

Notes.

BRITISH HOROLOGICAL INSTITUTE.—A lecture on "The Greenwich System of Time Signals," illustrated with diagrams, by William Ellis, Esq., F.R.A.S., of the Royal Observatory, Greenwich, is to be delivered at the house of the Society of Arts, on Friday, 24th February, at 8.30 p.m., the Right Hon. the Lord Mayor in the chair. Free admission to members of the Society of Arts.

WEST LONDON EXHIBITION.—A public meeting was held in the St. John's school-rooms, John-street, Tottenham-court-road, on Wednesday, the 8th inst., for the purpose of affording information respecting the industrial exhibition which has been set on foot in the western district of the metropolis, and adopting measures in furtherance of it. Deputy-Judge Payne occupied the chair, and was supported by Mr. J. A. Nicholay, Mr. T. H. Filmer, Messrs. G. Corbett and D. P. Foxwell, and a deputation from the Central Committee. The industrial exhibition movement in the west of London originated with the committee of the All Souls Working Men's Club. Ten members of the Working Men's Club Exhibitors' Committee, and an equal number elected from a public meeting, were soon constituted a central committee, whilst to secure an efficient representation of the surrounding districts, numerous public meetings have since been held, at which district committees have been formed, each of which appoints a delegate, who, with its chairman and secretary, become members of the central committee. With the view of obtaining a suitable building, it was determined to rent the site of the late Portman Barracks, until the end of June, for a sum of £500. Upon this it is proposed to erect a building, which will give ample accommodation. It is proposed to open the exhibition from the middle of April to the end of June. The com-

mittee calculate that to accomplish these objects they will require a guarantee fund of £2,000, over £1,200 of which has already been guaranteed.

EXHIBITIONS.—The Lucknow Exhibition was opened on the 24th December. All the capital for the great exhibition in Bombay has been subscribed, and all the shares have been taken up. The *Gazette* says:—"One great difficulty connected with the undertaking is occasioned by the want of available house-room in Bombay. The city is likely to get a name for very cold hospitality, if, after inviting ten thousand strangers to visit the exhibition, it denies them the ordinary accommodation of board and lodging. Yet there is certainly no place of shelter for a multitude of visitors in a city in which European residents often have to search vainly for weeks together for houses (or rather barns) in which to rest their heads. The projectors of the exhibition must therefore provide an hotel for their expected guests; and we hear that, as the time is too short for masonry work, it is their intention to have a large iron and terra-cotta building erected near the exhibition."

WHAT IS AN INCH OF RAIN?—The last weekly return of the Registrar-General gives the following interesting information in respect to rainfall:—"Rain fell in London to the amount of 0.43 inches, which is equivalent to 43 tons of rain per acre. The rainfall during last week varied from 30 tons per acre in Edinburgh to 215 tons per acre in Glasgow. An English acre consists of 6,272,640 square inches; and an inch deep of rain on an acre yields 6,272,640 cubic inches of water, which at 277.274 cubic inches to the gallon makes 22,622.5 gallons; and, as a gallon of distilled water weighs 10lb., the rainfall on an acre is 226,225lb. avoirdupois; but 2,240lb. are a ton, and consequently an inch deep of rain weighs 100.993 tons, or nearly 101 tons per acre. For every 100th of an inch a ton of water falls per acre." If any agriculturist were to try the experiment of distributing artificially that which nature so bountifully supplies, he would soon feel inclined to "rest and be thankful."

MEETINGS FOR THE ENSUING WEEK.

MON. ...Society of Arts, 8. Cantor Lectures. Professor Ansted F.R.S., "On the Applications of Geology to the Arts and Manufactures." (Lecture III.)
British Architects, 8.
Medical, 8.
R. United Service Inst., 8½. Commander P. H. Colomb, R.N., "On Modern Naval Tactics."

TUES. ...Civil Engineers, 8. Discussion upon Mr. England's Paper on "Giffard's Injector."
Statistical, 8. 1. Dr. Wm. Farr, "On Infant Mortality, and on alleged Inaccuracies of the Census." 2. Dr. Hyde Clarke, "On the supposed Decrease of the Turks."
Pathological, 8.
Ethnological, 8. 1. Mr. John Crawfurd, "On the History of Cannibalism in reference to Social Progress." 2. Mr. Travers, "On the Destruction of the Aborigines of Chat-ham Island by a Maori Invasion."
Royal Inst., 3. Prof. Tyndall, F.R.S., "On Electricity."

WED. ...Society of Arts, 8. Mr. George R. Burnell, F.G.S., "On the Municipal Organisation of Paris, especially with reference to Public Works."
Geological, 8. 1. Prof. R. Harkness, "On the Lower Silurian Rocks of the South-East of Cumberland, and the North-East of Westmoreland." 2. Mr. R. Spruce, "Note on the Volcanic Tufa of Latacunga, at the foot of Cotopaxi." Communicated by Sir R. Murchison. 3. Dr. H. P. Blackmore, "On a Discovery of Flint Implements in the Drift at Milford Hill, Salisbury." Communicated by Mr. John Evans.
Archaeological Assoc., 8½.

THURS. ...Royal Inst., 3. Prof. Tyndall, F.R.S., "On Electricity."
Antiquaries, 8.
Royal, 8½.
Philosophical Club, 6.

FRI.Royal United Service Institution, 3. Capt. H. Schaw, R.E., "The Employment of Electricity in Military Operations."
Royal Inst., 8. Mr. John Evans, "On the Forgery of Antiquities."

SAT.R. Botanic, 3½.
Royal Inst., 3. (No Lecture.)

PARLIAMENTARY PAPERS.

SESSIONAL PRINTED PAPERS.

- Par.
Numb.
 66 (v.) Trade and Navigation—Accounts.
 490. Poor Removal—Return.
 501. Tea, Sugar, &c.—Returns.
 496. Dockyards—Second Report (corrected).
 548. Coroners' Inquests—Return.
 499. Caledonian Canal—Fifty-ninth Report of Commissioners.
 500. Naval Prize Money, &c.—Account.
 516. Coinage—Account.
 541. Hamilton Place—Correspondence.
 519. Customs Clerks—Return.
 525. China—Orders in Council, &c.
 509. National Education (Ireland)—Minute of the Board.
 538. County Rates, &c. Charges—Return.
 563. Fisheries (Ireland)—Return.
 557. Registration of Deeds (Ireland)—Account.
 20. Railways—Return.
 540. Militia (Ireland)—Returns.
 542. Fine Insurances—Account.
 564. Royal Dublin Society—Correspondence.
 572. Burgess Rolls (Dublin)—Returns.
 565. Income and Property Tax—Returns.
 576. Union Valuation Lists—Returns.
 409 (i.) Soldiers and Police—Further Return.
 504. Patent Office and Museum—Report.
 514. Navy (Ships)—Annual Account.
 530. North American (Intercolonial Railway)—Correspondence.
 531. Malta—Copy of Two Petitions.
 534. Railways—Returns.
 537. Metropolitan Parish Rates—Return.
 543. Metford's Explosive Bullet—Correspondence.
 555. Pacific Mails—Contract.
 558. East India (Meer Ali Morad)—Extracts of Correspondence.
 559. East India (Regimental Workshops)—Statement.
 567. Ribbon Manufacturers—Report.
 570. William Adey—Correspondence.
 571. Lunacy (Scotland)—Return.
 573. Landed Estates Court (Ireland)—Memorials.
 545. Standing Orders (1864).
 496. Dockyards—Second Report and Evidence.
 507 (A i.) Poor Rates, &c.—Report (A)
 578. Army Breech Loaders—Report.
 66 (vii.) Trade and Navigation Accounts.
 507 (A ii.) Poor Rates and Pauperism—Statement.
 526. Quarter Sessions (Ireland) &c.—Returns.
 566. Income and Property Tax—Return.
 574. Clifden Union—Correspondence.
 575. Dunkirk Union—Charges, Evidence, &c.
 792. County Treasurers—Abstract of Accounts.
 487. Seaside (Metropolis)—Report and Evidence.
 449. Savings Banks—Return.
 527. Public Offices—Returns.
 562. Co-operation (Ireland)—Letter.
 560. Customs Tariffs (Colonies)—Return.
 213. Lighthouses, &c. (Ireland)—Report.

Patents.

From Commissioners of Patents Journal, February 10th.

GRANTS OF PROVISIONAL PROTECTION.

- Air, impregnating with vapours from tar, &c., for hygienic or therapeutic purposes—112—A. J. Sax.
 Alcohol, rectification of—250—W. E. Newton.
 Animals, bits for—66—L. Weber.
 Animals, oil cake and food for—282—G. J. Virtue.
 Arm chair, portable folding—280—W. E. Gedge.
 Boats, apparatus for lowering—210—T. Steel.
 Buildings, roofs or coverings for—129—F. C. Fourneau.
 Carriages, instantaneously releasing horses from—2925—G. Prioleau.
 Carriage step arrangements—182—H. A. Dobson.
 Cast iron, treating articles of—192—P. M. Parsons.
 Chimney-pots—264—G. Carter.
 China, &c., placing in receptacles for firing—276—J. Meakin.
 Clothes fastener—268—J. W. Gill.
 Coal dust, &c., machinery for compressing—220—W. Smith.
 Coal gas, purification of—226—A. A. Croll.
 Corkscrews—283—J. Roper.
 Cotton gins—248—B. Dobson and W. Slater.
 Drilling machines, &c., action and arrangement of—341—J. Combe.
 Electric pile—206—J. Rovire and H. A. B. Iluguet.
 Electric telegraph wires, laying, &c.—269—R. A. Brooman.
 Fibrous materials, apparatus for washing—251—J. Petrie, jun.
 Fibrous materials, preparation of—158—T. Mayor.
 Fibrous materials, washing and drying—281—J. and W. McNaught.
 Fibrous substances, expressing oil or grease from—261—W. Teall and A. Naylor.
 Fire-arms—188—J. Spider, jun.
 Fire-arms, breech-loading—124—W. Ansell.
 Flax, &c., breaking and scutching—277—J. Gray.

- Fruit, means of preserving—207—G. Haseltine.
 Furniture, rendering soundless—196—A. Drevelle.
 Grinding corn, feeding apparatus of mills for—205—R. R. Riches and C. J. Watts.
 Hot pressing, folding fabrics on to cardboards for—278—A. Freeman.
 Hydraulic steering apparatus and rudder break—118—A. and E. Paul.
 Hydro-carbon fluids, lanterns for burning—266—A. S. Macrae.
 Ice safes—230—C. Falck.
 Iron and steel, manufacture of—229—J. G. Willans.
 Kempy wool and hair, colouring—227—H. W. Ripley.
 Lamps, shades or globes for—266—R. A. Brooman.
 Lifts, mode of working hydraulic—180—W. Clay.
 Locomotion on land—271—M. Henry.
 Maize, &c., manufacturing syrup and sugar from—246—G. Haseltine.
 Manure, manufacture of—202—B. King.
 Metal for roofing, preparing and fixing plates of—232—G. Dibley.
 Metals, anti-corrosive varnish for protecting—259—J. McInnes.
 Mixed fabrics, separating wool from—323—S. Saville.
 Mortar mills—252—J. Raines.
 Motive power, &c.—55—G. B. Galloway.
 New thread for weaving, manufacture of—212—R. A. Brooman.
 Oils obtained from tar, treatment of—244—J. H. Johnson.
 Paper, apparatus for drying—198—A. Sheldon.
 Photographs, giving permanence to and ornamenting—72—E. Pettitt.
 Photographs, producing and finishing—56—B. W. Bentley and W. H. Bailey.
 Pipes, sockets for—285—G. H. Pierce.
 Ploughs—34—J. Skelton.
 Puddling furnaces, lining the sides and bottoms of—224—R. Mushet.
 Pumps—186—J. H. Wilson.
 Railroad, permanent ways for—184—J. G. Wilson.
 Railway carriages, adjusting the weight of—216—O. Gossell.
 Railways, permanent way of—164—R. Mallet.
 Railways, permanent way of—275—E. P. Colquhoun and J. P. Ferris.
 Revolving motion, intermittent and continuous—272—T. Hall and S. Bonser.
 Saddle trees, manufacture of—J. Southall, jun., and H. Southall.
 Scents, apparatus for containing and dispersing—194—E. Atkinson.
 Shells (explosive), construction of—136—J. B. Cotter.
 Ships, cleansing the bottoms of, at sea—225—J. Harrison.
 Ships, &c., coating the bottoms and sides of—284—J. Moysey.
 Ships, forts, &c., armour-plated—286—J. Hughes.
 Ships logs and sounding machines—233—J. E. Massey.
 Spring mattresses and paliasses—24—D. Vericchio.
 Steam boilers, preventing deposits in—219—C. D. Abel.
 Steam generators—243—J. Twibill.
 Steam joints, &c., packing for—217—W. Paton.
 Submarine cables, working of—156—S. F. Van Choate.
 Tanning hides and skins—270—W. H. Cox.
 Tar oils, treatment of—245—A. H. Brandon.
 Theodolites—70—B. P. Bidder.
 Throstle spinning frames—236—C. D. Abel.
 Venetian blinds, apparatus for painting—170—D. Munro & T. Wright.
 Vessels, machinery for propelling—228—J. Hamilton, jun.
 Vulcanising compounds and vulcanised fabrics—176—B. F. Stevens.
 Wall fruit trees, frost screen awnings and netting for protecting—287
 —C. A. Wheeler.
 Wires ropes, apparatus for relieving the strain on—262—J. Gibson.
 Woolen cloth, &c., facing—178—J. Snell and W. Renton.

PATENTS SEALED.

- | | |
|--------------------------|--------------------------|
| 1999. A. V. Newton. | 2039. C. F. Darcagne. |
| 2021. J. B. Buffoni. | 2044. W. Dalziel. |
| 2029. S. Moore. | 2048. T. Wilson. |
| 2031. R. A. Brooman. | 2051. L. Yvoise-Laurent. |
| 2032. S. and C. Collins. | 2091. J. Barnsley. |
| 2037. W. Dove. | |

From Commissioners of Patents Journal, February 14th.

PATENTS SEALED.

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| 2050. J. J. Parkes. | 2130. W. Clark. |
| 2057. E. H. Waldenstrom. | 2135. W. Bullough. |
| 2063. J. Thomsen. | 2150. T. Fowler. |
| 2072. F. Taylor. | 2196. A. V. Newton. |
| 2073. J. Allian. | 2702. I. Schwartz. |
| 2074. B. W. Barwick and W. Hartley. | 2784. J. Thompson. |
| 2079. J. E. Grisdale. | 3146. Sir J. Gray. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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| 340. J. Dickson. | 362. F. J. Bolton. |
| 311. A. C. Bamlett. | 384. T. Davison. |
| 324. P. Shaw. | 395. W. G. Valentin. |
| 325. H. A. Silver. | 408. C. Turner and J. Shaw. |
| 328. W. Clark. | 443. W. Hinton. |
| 657. E. G. Camp. | 737. W. Barber. |
| 370. R. A. Brooman. | 376. J. S. Joseph. |
| 691. M. Henry. | 390. E. E. Allen and J. Stewart. |
| 354. W. Macnab. | 392. E. Green and J. Newman. |
| 359. R. Johnson. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

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| 233. R. W. Johnson and W. Stables. | 250. R. Aytoun. |
| 361. G. and J. E. Baker. | 288. W. Cope. |
| 324. E. Leigh. | 257. G. A. Barrett, W. Exall, |
| 246. E. Stevens. | and C. J. Andrewes. |